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EAST EUROPE REPORT

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ANNIVERSARY OF CSSR NUCLEAR RESEARCH

Prague RUDE PRAVO in Czech 10 Jul 85 p 3

[Interview with Dr. Josef Tucek, Associate Professor, Candidate of Science, Director of the Nuclear Physics Institute of the CSSR Academy of Sciences, by Stanislav Kuzel; date and place not specified; title of article: "A Discovery is the Beginning of Further Work"]

[Text] From the windows of a train passing through the Vltava Valley on the way from Prague to Kralupy, it is possible to see white buildings on the opposite bank at the point where the river widens. Today, the research facility in Rez is home to two scientific institutions, namely the Nuclear Research Institute and the Nuclear Physics Institute, which are part of the Czechoslovak Academy of Sciences. They are celebrating the 30th anniversary of their founding. Atomic reactors have during this period become a common power source and the physicists have turned the manifold secrets of the microworld into numbers, data and facts. The structure of matter, however, continues to pose ever new questions. These questions are discussed with Dr. Josef Tucek, Associate Professor, Candidate of Sciences, Director of the Nuclear Physics Institute of the Czechoslovak Academy of Sciences.

[Question] Comrade Professor, it is said that you remember the beginnings of nuclear research in Czechoslovakia. Can you tell us about them?

[Answer] That's true. I am one of the people who remembers the period after WWII when nuclear research in Czechoslovakia began to develop from almost nothing. It was associated only with research on cosmic radiation. There was no industrial basis, no material or technical equipment, not even any qualified specialists. The existing work dealt with theory or with applications of theory, as for example the irradiation of tumors in medicine. Nuclear physics, dealing with research into the microstructure of our world, gained great impetus at the end of the World War, unfortunately by the emergence of the atomic bomb. In the subsequent years, nuclear physics developed very intensively. We were glad to see that, in 1955, on the initiative of the Soviet Union, an agreement was signed which placed the cornerstone for the development of our Institute as well as for the actual development of nuclear research in Czechoslovakia.

[Question] That means that there was close cooperation with Soviet specialists from the very beginning . . .

[Answer] The need for international cooperation was apparent from the outset. Already at that time, features began to appear in this subject area which gradually began to surface in other sciences. In particular, the cycle of basic research in the sciences is lengthening, in our case it is 7-8 years. Large groups of researchers are being formed to specialize in electronics, computer technology, digital methods for solving physical problems, large scale data processing, and so on. The third factor is the cost of experimental facilities. Building a cyclotron takes many years and costs tens of millions of Kcs. At the same time, the actual research equipment--instruments, sensors, special apparatus for individual experiments--costs at least that much. All of this, together with the need for being up-to-date in knowledge--so that we do not try to discover something already researched elsewhere, and therefore waste resources unnecessarily--leads logically to the international integration of research.

Around the same time, similar institutes were established in other socialist countries such as the GDR, Poland, Hungary, and Bulgaria. Slowly, a cornerstone was being laid for the establishment of the United Institute for Nuclear Research (SUJV) in Dubna, near Moscow. This Institute has become a center which makes it possible to use genuinely unique equipment, the cost of which today reaches from the millions to the billions, levels that no small country could finance individually. The Institute in Dubna coordinates research, and makes it possible to make innovations in our experimental equipment, and educate our young scientists. Our entire generation of scientists has passed through Dubna and owes it its scientific foundation.

[Question] What were the fundamental stages of the development of the Institute and the development of nuclear physics in Czechoslovakia?

[Answer] The original Institute was based on the concept of two basic laboratories. The fundamental area of endeavor for the first was an experimental atomic reactor which, after being upgraded and reconstructed, is still in operation at the Institute of Nuclear Research, which became independent of the Czechoslovak Academy of Sciences in 1972. However, it remains an important source of neutrons, is used to test a number of equipment components for nuclear power plants, and produces isotopes for the needs of medicine and the national economy.

The second fundamental piece of equipment was the cyclotron, which accelerates particles to energy levels which we now look upon as low. In the measurement area, it was necessary to develop a corresponding detection and instrumentation technology. Semiconductor sensors we have developed have been used not just in Czechoslovakia, but in Dubna as well, and the new version is being manufactured at the Institute to this day.

A period of full and intensive application of instrument technology lasted for about ten years, during which time our research results took us not to the top of world nuclear physics, but to a very good international level

which we have maintained in the lower energy area to the present day. However, then came a period when our equipment began to be antiquated and it was necessary to enter a higher level. The cyclotron that had worked well for 15 years and on which many significant research projects had been performed was dismantled about 10 years ago and, with the cooperation of the UINR in Dubna, we developed and built a new and improved isochronic cyclotron which accelerates to a significantly higher energy level.

Using the cyclotron, we can make subtle changes in the energy of the accelerated particle beams, and therefore make qualitatively new observations. A higher level of research is also a result of modern computer technology, which makes it possible to extract from the cyclotron information of an order that had previously been undreamed of.

[Question] And this brings us to the present day . . . ?

[Answer] Yes. And I think it is fair to say that today, in the field of nuclear and subnuclear physics, there is certainly no major discovery that will slip by us, and we will be able to evaluate it and incorporate it into our process either in Czechoslovakia or in Dubna.

[Question] However, a question has occurred to me, namely whether nuclear research is useful for Czechoslovakia, whether it is not just a luxury when the decisive research and discoveries are in the area of very high energies in large institutions and international centers such as Dubna, CERN, Serpuchovo, or some U.S. universities.

[Answer] This question comes up constantly, and we discuss it often. I personally am convinced that the research we are conducting has its value. The secret of matter is not going to be solved solely on the basis of some large discoveries. It isn't enough just to discover radioactivity, it is also necessary to measure the half-lives of the decomposition of individual particles of the atomic nucleus and to determine what happens to them under certain conditions, whether they release energy and to what extent, in short, to do the entire extensive and quantitative research which then leads to results such as, for example, today's nuclear power plants. We would not be able to build nuclear power plants solely on the basis of the discovery of the existence of the atomic nucleus and radioactivity . . . . For this purpose, it is necessary to have a different range of information and knowledge. We need a group of people that is capable of understanding this discovery and follow up on it, and to see its possibilities. We must educate people who are able to utilize the results of discoveries and work in such a way that we could deal with the role that we play in nuclear physics to such a degree that we would reach a level of knowledge and abilities such that it would be possible for us to take the most recent results and gradually apply them in further research and in production. Nuclear research is demanding not just financially, but also on an expert level. In the future, we want to maintain the high standard of research which we have in comparison to the rest of the world. Preconditions do exist in our country.

[Interviewer] Thank you for speaking with us.

12993
CSO: 2402/21

MICROORGANISMS USED AGAINST PESTS

Prague RUDE PRAVO in Czech 30 Jul 85 p 5

[Article by Eng Karel Muller and Dr Jiri Kafka: "Microorganisms Against Vermin"]

[Text] Our notions about the use of microorganisms are quite realistic when it concerns baker's yeast, production of beer and wine, or dairy industry. Recently we encountered also the term 'biotechnology.' We presume that with the aid of microorganisms we shall produce various solvents, antibiotics, growth substances and hormones, enzymes, organic acids, nucleic acids (which transmit genetic information in living organisms), vitamins, polymers (high molecular compounds, most of them malleable, formable, light, inexpensive and with good thermal and insulating properties) and certain alkaloids (vegetable substances with application in medicine).

We also have some knowledge about the microorganisms as the cause of numerous diseases in humans, animals and plants. Therefore, it is logical that there must exist some microorganisms which cause diseases in insects. This notion is rather recent. The original information about potential microbiological insecticide came from the university of Pavia at the beginning of the 19th century. Agostino Basi ascertained that the disease affecting the caterpillars of silkworm was in fact a fungal infection. Progress in the use of microorganisms in the fight against insects was noted only in the middle of this century, thanks to Steinhaus who published the pivotal study in the field of insect pathology.

Some microorganisms live in nature in close association with insects and are mutually beneficial. They exist mainly with those species of insects which are not capable of obtaining total nutrition. Carnivorous insects do not need such microorganisms. Bloodsucking or nectar-sucking insects use such microorganisms to supplement their growth factors. The only exception are mosquitoes. In complex natural relations insects cannot depend on incidental contacts with the microorganisms they vitally need, and for that reason they developed a mechanism for transmitting these microbes to individuals of the next generation. However, there exist also pathogenous (disease-causing) microorganisms which cause diseases in insects.

Insects have natural protection against mechanical and chemical impairment in the form of a tough chitin integument which protects their bodies against penetration by microorganisms. If this covering is damaged, the microbes have an open way to the body of the insect. The impairment may be mechanical (for instance, damage caused by inorganic dust, a parasite's ovipositor), chemical (by a toxin affecting intestinal functions) or physical (by climatic factors, changes of temperature, humidity, lack of air).

The best possible conditions for insecticide by microorganisms are in temperature ranging from 20 to 27° C. However, we can expect such conditions in nature only during a limited period in summer. Nevertheless, in greenhouse gardening and in certain food storage and facilities such conditions may be maintained over a long period. In nature this limited thermal factor is often enhanced by the idiosyncrases in the development of insects. In enclosed areas where certain species of insects live (tunnels of wood-boring insects, curled-up leaves which shelter caterpillars) insects often get "half-stifled and parched." This results in their death. Occasionally mechanical damage may be caused by frost which impairs the tissues of insects; a thin layer of a fluid appears on the surface and the bacteria which need those nutrients for their development destroy the caterpillars which turn black.

We know already many microbes capable of poisoning insects, in the first place Bacillus thuringiensis, isolated for the first time by Berliner in 1909 from the larvae of flour moth in a grist mill in Thuringia (hence its name). The larvae were destroyed by the "torpid disease" due to which they turned black and hung languidly head-down. Studies in depth confirmed that the microbe is a ciliated rod which at the end of its body produces a resistant cell--the spore.

This microbe has a quite unusual trait which is unique in the microbial world, namely, it produces protein crystals (diamond-shaped), the so-called parasporal corpuscle. This crystal contains two toxins which are insoluble in water, but which dissolve readily in the alkaline medium of insect intestines. Here the toxin is released and the resulting injury to the intestinal walls brings about the death of the insect in approximately 5 days.

The above-mentioned microbe is used against the larvae of butterflies (Lepidoptera). In agriculture it is effective against about 30 important species, in forestry against about 15 species. It is used against pests (moths) in storerooms. It should be mentioned that a sufficient amount of microbes must penetrate the body of the insect so that they may accomplish their destructive action. Fatal doses amount to thousands of spores per individual insect.

DIPEL, a product used in the CSSR, contained about 25 billion spores per gram. This substance has the advantage that it is relatively stable; in fact, it waits for the opportunity to come in contact with a particular insect. Plants treated with it may be used as fodder with no toxic effect on the livestock, bees or humans. A dose of 10 billion spores per person and day did not affect food products at all. BATHURIN 82, a product already manufactured in our country, contains 16,000 spores per mg.

A rich palette of microorganisms which effectively impair certain species of insects exists in nature. Many microbes are still waiting to be discovered. A privileged position is held by the Pseudomonas species which penetrates the body of the insect and causes its death in 2 hours to 3 days. Dead caterpillars release a water-soluble dye which turns them yellowish green or blue. The microbe commonly appears in the soil and water and is effective against grasshoppers, locusts, bee moths, silkworms and cabbage butterflies.

Good results have been known and confirmed in several species of these microbes. At present we have at our disposal reliable products which efficiently destroy certain species of insect pests. It is desirable that research in cooperation with praxis discover many more species of microbes usable for that purpose. It is certain that it would mean an effective contribution to our efforts to curtail excessive use of chemicals with all their negative consequences and to aid our agriculture and environment.

9004
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CSSR PHYSICISTS MEET

Bratislava PRAVDA in Slovak 5 Sep 85 p 4

[Article by RNDr Juraj Sebesta, CSc, Dept of Mathematics and Physics of Comenius University, Bratislava: "Physics -- a Basis for Progress in Research and Development"]

[Text] The Eighth Conference of Czechoslovak Physicists was held on 26-30 August 1985 in Bratislava. The conference participants have appointed 2 goals to be achieved, namely: to evaluate the results of research in the field of physics in CSSR for the past period; and to get acquainted with the main tasks in physics for the 8th Five-Year Plan. That is why the organizers of the conference have selected a program which would offer to the 600 participants present as complete information as possible on the current state and perspectives of physics not only in the CSSR, but also worldwide. During the 5 days there were read 27 review reports and approximately 80 original contributions were presented in 13 symposia.

In recent years, there have been achieved quite a few successes by Czechoslovak physicists, namely in discovering new patterns in nature, in preparation of new technologies and production processes, in developing new apparatus, etc. Let us just mention the obtaining of materials by cryogenics, the development of superconductive materials, the plasmic-chemical processing of surfaces, the unique new construction of permanent magnets, the utilization of synchrotron radiation for analyses of materials. Participating considerably in the mentioned successes were the following centers of physical research in Slovakia: the CEFV (Center for Electro-Physical Research) of the Institute of Physics and Electrotechnics of the Slovak Academy of Sciences in Bratislava, the Institute of Experimental Physics of the Slovak Academy of Sciences in Kosice, and departments of physics in Slovak universities.

Recent decades have been characterized by an effort to establish the closest connection possible between theoretical and applied physics. In this area, a good base has been found in educational research and production associations. An example of their achievements is the first Czechoslovak black-and-white planary scanner for TV cameras used in robotics and technologies employing robots. It has been developed as a result of cooperation between the communal enterprise Tesla in Piestany and the Department of Physical Electronics of the Slovak Academy of Sciences Center for Electro-Physical Research in Piestany.

The reserach program in physics, proposed in the framework of the 8th Five-Year Plan's state plan for basic research, is concentrated around 6 key points: nuclear and subnuclear physics; semiconductors and dielectrics physics; physics of superconductors, metals and magnetic materials; plasma physics; wave and quantum phenomena in optics; and biophysics.

In order to fulfill the assigned tasks,it is necessary to meet certain conditions. One of them is the necessity -- due to a limited number of employees and financial means as well -- of making a maximal use of CEMA research and development programs and projects of the socialist countries' academies of sciences. Of special importance here is cooperation with USSR. Its implementation will be enhanced by the program of mutual cooperation between the USSR Academy of Sciences and the Czechoslovak Academy of Sciences for 1986-1990, signed at the beginning of 1985. The latter comprises 8 integrated target programs, out of which 5 are in the field of physics.

In some key areas it will be expedient to concentrate budgetary means and build central national laboratories, e.g. a laboratory for the utilization of synchrotronic radiation, a laboratory for the utilization of heavy ions, laboratories for superstrong magnetic fields, ultralow temperatures, pressures, etc.

Next to research programs for applied physics it is necessary to give enough space also to basic research. Past experience has shown that all important innovations in the sphere of physics, which have substantially affected progress in science and technology, resulted from findings obtained in basic research.

At the conference it was stated, among other things, that although in the past physics significantly affected the development of both technology and production, an unwillingness to hire physicists in enterprises and plants still persists. In industrially developed countries, however, it is a common practice. Physicists make themselves useful in research, development, and design, in working with computers and also directly in production.

The fulfilling of the social mission of physics in the field of technology and production, as well as in forming the style of scientific reasoning and developing a scientific world outlook, is closely connected with an improvement in the quality of physics instruction in all kinds and grades of schools. What is involved here, in the first place, is an upgrading of the educational process, based on a coherent view of physics, on utilizing new aids of instruction, and computer technique as well. In the second place, there is a need for improvement in the preparation of physics teachers who would be able to inspire interest in young people for studying the fields of physics and technology.

The conference discussions have effectively demonstrated that Czechoslovak physicists are ready to exert all their efforts for fulfilling the conference's motto: Physics -- the Foundation of Scientific Research and Development.

9910
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CZECHOSLOVAKIA

CZECH-SOVIET COOPERATION IN AUTOMATION RESEARCH

Bratislava PRAVDA in Slovak 27 Sep 85 p 3

[Article by Jozef Supsak: "There are Still Many Empty Chairs at the Common Table"]

[Excerpts] At the end of 1983, the Czechoslovak-Soviet design projects and technological bureau "Robot" was formed in Presov. This was a further stage in the development of cooperation on robotics between the CSSR and the USSR. In the bureau there were opportunities for leading Czechoslovak and Soviet experts to develop robot complexes jointly within a few weeks for the fields of mechanized processing, shaping, and assembly.

In the middle of March of that year, the governments of the CSSR and the USSR agreed on cooperative aciton in the field of developing robotic complexes and flexible production systems. So in Presov they set up an international organization, the Robot international research and development association. This began the qualitatively highest stage in research and development cooperation of the two countries in the field of robotics.

The agreement between the two governments is aimed primarily at the main areas for further development and intensificaiton of economic and research and development cooperation by the CEMA member countries, as approved by the CEMA economic council at the highest level in June 1984. It is in accordance with the multilateral cooperative roles of the CEMA member countries in the field of automating machine production on the basis of robotics complexes [RC] and flexible production systems [FPS]. The basic goal of this international association is to put into effect a unified research and development policy and to ensure the overall development of priority areas in engineering. It is also to reach the top world level of quality in the development of robotics complexes and flexible production systems for subsequent large-scale production on the basis of specialization and cooperation and the development of direct relations between organizations of the two countries. An integral part of the agreement is a program of scientific research, developmental, design technological, and experimental projects and a program for the production of RC and FPS prototypes for the years 1985 to 1990. The association has laid out for itself the goal of accomplishing these four key tasks:

-- to carry out extensive scientific research, developmental, design technological, and experimental projects;

-- to produce prototypes, carry out servicing, and train specialists;

-- to determine the needs for robot technical facilities and prepare proposals for specialization and cooperation in production, including the development of production capacity;

-- to meet the needs for robotization in both countries by supplying each other.

Understandably, at the center of attention for the association there will also be patent and license actions with recommendations for standardization and unification of types. The rights of an international organization also include carrying out foreign trade and other foreign economic activities, including the purchase and sale of licenses and know-how.

Since this is a unique international organization in the CSSR, let us look at the method of management and organization of work. The association's activities are managed by a Council of Commissioners made up of six representatives of the higher state agencies of each country. For the CSSR, these are representatives of the State Commission for Scientific-Technical and Capital Development, the State Planning Commission, the Federal Ministry of Finance, the Federal Ministry of General Engineering, the Federal Ministry of Metallurgy and heavy Engineering, and the Federal Ministry of the Electrotechnical Industry. The actual management agency of the association is the Association Council, which is made up of fully authorized representatives of the individual economic organizations which are members of the association. The CSSR has the following organizations in the association: the economic production unit [VHJ] Martin Heavy Engineering Plants, VHJ Prague Factory Engineering Equipment [TST], Presov Metal Industry Research Institute, VHJ Prague Automation and Computer Equipment Plants [ZAVT], VHJ Prague High-Current Electronic Equipment Plants [ZSE], the Nove Mesto nad Vahom Mechanization and Atuomation Research Institute, and VHJ Brno Chepos. Operational management of the "Robot" international research and development association is the responsibility of its leadership, which consists of the general manager [who is likewise the general design engineer] and his deputies. The association is currently preparing to establish representation in Prague and Moscow.

"By the fact that the "Robot" international research and development association was formed," said Eng Miroslav Vajs, first deputy general director of the association, "research and development cooperation on robotization between the CSSR and the USSR is reaching a new dimension and a higher quality than before. The worldwide trend in automation is such that putting together one robot and one or two machines is no longer effective. Effective robotics complexes and flexible production systems using the most modern means of automation are already being developed and built. As a small country, albeit one with a developed scientific and technical potential, we are not able to keep up with the best in the world. This is for a simple reason. We do not have sufficient creative capacity in engineers, technicians, and

robotics experts that we could develop such technological robotics systems. And finally production of complicated robotized complexes in small numbers just for Czechoslovak needs would be uneconomical. If we want to carry out the intentions of increasing the social productivity of labor, we must put automation of production with the use of robotics on a firm basis of multilateral and bilateral international socialist cooperation, especially with the USSR. The international research and development association "Robot" provides all the prerequisites for this since it will coordinate and manage the preproduction stages, production, and the postproduction stages. According to the association's bylaws, our experts and the Soviet ones will sit at a common table for a full 4 years. After that period, other specialists will come into the association, naturally with new ideas and thoughts and original solutions. I think that in these conditions of an international composition of specialists there are all the prerequisites for effecting a unified technical policy in robotization. It is actually the basic prerequisite for the higher forms of cooperation. On the basis of the unified technical policy, representative projects will be laid out for joint execution by the Czechoslavak-Soviet collectives. What purpose is this actually pursuing? The goal is to develop representative robotics complexes and flexible production systems. Afterwards it will not be hard to distribute the tasks as to which country will produce, perfect, and supply what. In this way cooperation and specialization of production are significantly intensified. And what is equally important, the volume of production of the automation equipment is increased. The information base also cannot be ignored. We have to admit that on the international scale we do not always know everything about each other as to what is being developed or what we intend to develop and produce. To a certain degree, this is also true because the production of industrial robots and manipulators and other peripheral equipment in both the CSSR and the USSR is the responsibility of a number of ministries. Now we will have specialists form the CSSR and the USSR sitting at one drawing table and at one desk, people who know in detail the questions of robotization in their own countries. The direct exchange of information right at the workplace will actually be the richest information base for laying out the unified technical policy."

"From the time that the intergovernmental agreement was signed, it was only a few months before the first work was underway," said Eng Vladimir Kavecansky, chief of the department of overall planning and coordination in the international research and development association "Robot". "The first 46 experts from throughout the CSSR who are already here are formulating a unified Czechoslovak scientific technical policy for the field of robotization. When the first Soviet specialists soon arrive at the association, we what to submit constructive proposals as to what we can offer to the USSR and explain our ideas on the further development of robotics complexes and flexible production systems. The first results of the international association should come by the year 1987, but the CSSR and the USSR have already worked out ideas on several subjects on a bilateral basis. In the field of research and development, there are six common subjects.

Among the most important is the task of working up a common concept of RC and FPS development for the basic machine tool technology, such as processing,

shaping, welding, and assembly. The task will culminate in 1990 with the working out of a common concept and its inclusion in common plans. This involves us saying clearly what we will develop and what the USSR will develop. The common intention should then be expressed in specialized or cooperative production. The first partial results of joint research and development should be made known next year. In the field of design, there are eight subjects on the program. Let us mention the flexible production system for the technology of processing crankshaft components of up to 160 kg in weight. The task will end with the design documentation and the delivery of the Czechoslovak flexible production system to the USSR. We are testing it already this year and at the beginning of next year we will deliver it to our Soviet partner. The other subjects are directed at joint working out of representative design documentation for robotics complexes. The third area of cooperation is even more interesting, that of the production and delivery of robotics complexes and flexible production systems. This perhaps best demonstrates to what an extent the research and development work has been worked out. It would by far not be enough just to draw up the documentation jointly, but it is rather a matter of the production and mutual supplying of robotics complexes on the basis of the results. This year we have worked out a total of 17 subjects for cooperation with specific material outputs being developed from this year on. In addition to the delivery of the flexible production system for processing already mentioned, we are currently preparing three robotic workplaces for arc welding which we also will deliver to the USSR. We have also worked out the material composition of robotic workplaces for other technologies, including robotic assembly complexes. The good start of the international research and development association Robot was also a result of the fact that in Presov for the past 2 years there has been a joint Czechoslovak-Soviet design engineering and technological bureau functioning which has already achieved its first results. In the Eighth 5-Year Plan, we will be dealing with the development, design, and implementation of more complex entities of robotics complexes and flexible production systems which are used for specialization of production. Even today it is obvious that through coordinated development and production and supplying each other we can accelerate the cycle of research-development-production-utilization and avoid duplication in research and production.

There are currently 46 employees working in the association and by the end of the year this number is supposed to increase to 144, of which 52 will be from the USSR. Next year there are supposed to be 240 workers at the association and by the end of 1990 there will be about 350 top-rate employees. The arrival of the first Soviet specialists with their families is expected in Presov in the next few weeks. But in Presov they are beating their heads against the wall trying to get engineers and technicians from the CSSR to work in the international association. We must keep in mind that this is not a matter of just any kind of personnel, but people with years of experience and with high professional skills and experience in the field of robotization, electronics, planning, conceptualization, etc. When the association leadership turned to the seven Czechoslovak organizations in the "Robot" association for them to select a total of 54 specialists to work in Presov, the response was symbolic. They succeeded in acquiring just a few experts,

which could be counted on the fingers of your two hands... The greatest "hunger" is for experts from the economic production units located in Prague, such as ZSE, TST, ZAVT, or Chepos in Brno. Without highly qualified specialists for the field of robotization, however, the work cannot be followed through to top-rate results.

Besides the employees from the seven decisive organizations of each country who will work directly in the international association "Robot", other research institutes, scientific production associations, and factories will enter into the association's work. In addition to the approximately 350 people who will be the core workers at the association by the end of 1990, there should also be a total of 1 million workers tied into the scientific-technical association "Robot" [directly or indirectly] in the preproduction, production, and postproduction stages in the CSSR and the USSR.

6285
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CZECHOSLOVAKIA

BRIEFS

COLORIMETRIC TESTING--Bratislava. The kraj laboratories of the State Commerce Inspection have successfully tested the so-called colorimetric method for determining foreign substances in vegetables. These tests, based on the SSR Ministry of Health directions, were conducted by the SSR Ministry of Commerce in order to set up an internal procedure for controlling the content of nitrates and nitrites in fruits and vegetables. The problem came to light primarily in connection with controlling the amount of these substances in produce supplied by small growers and sold by market vendors. The SSR Ministry of Commerce assigned the State Commerce Inspection the task of conducting analyses of vegetables for their content of nitrites and nitrates. The colorimetric method has been approved by the chief hygienist of SSR as a standard procedure for determining the presence of these noxious substances in comestibles. The State Commerce Inspection (SOI) began the testing in all krajs as soon as spring speeded vegetables appeared on the market. The SOI also concluded an agreement with the General Directorate of the Fruits and Vegetables Corporation, according to which its laboratories would perform analyses of vegetables purchased from small growers in purchase centers of the Vegetables enterprise. [Article by CSTK: "Measures to Protect the Consumer"] [Text] [Bratislava PRAVDA in Slovak 22 Jul 85 p 2]

9910
CSO: 2402/20

GERMAN DEMOCRATIC REPUBLIC

RESEARCH CENTER DIRECTOR ASSESSES ROBOTICS TECHNOLOGY PROGRESS

East Berlin PRESSE-INFORMATIONEN in German No 56, 17 May 85 pp 3-4

[Article by Dr Peter Ulrich, engineer, director, Karl-Marx-Stadt Research Center for Machine Tool Construction]

[Excerpts] At the end of last year the national economy of the GDR had at its disposal over 43,299 industrial robots. They are employed primarily in the autonomous manipulation of tools, workpieces and materials; they have also proven themselves in welding and painting and in feeding machines and industrial furnaces. On the scale of our entire economy as well as in many combines and factories much has been accomplished and is now being accomplished to create the technology which is so important for improving employees' working and living conditions. Robotics is proving itself to be a catalyst in the introduction of new technologies on the road toward modernization of our existing physical plant.

Great Increase in Labor Productivity

Particularly in the complex employment of industrial robots in conjunction with machine tools a high level of economic efficiency is being attained. Here, by way of example, I should like to mention the manufacturing system consisting of a track-borne industrial robot and three CNC machine tools. This system was constructed by collectives within our research center and within the parent plant of the "Fritz Heckert" VEB Machine Tool Combine. The industrial robot operates with great precision in feeding the machines so that a high level of stability is guaranteed for the entire system. Labor productivity has increased by 200 percent. It has been possible for 4.5 workers to take over another activity.

In the parent plant of the "Herbert Warnke" VEB Metalworking Combine in Erfurt--to mention a further example--a technological unit has been constructed out of one industrial robot and two lathes. This has yielded an 80-percent increase in labor productivity.

High production technology calls for a suitably adapted environment. But traditional machines also, as in the second case cited above, still possess reserves which should be fully exploited on the route toward modernization.

Our experience shows that in spite of the employment of industrial robots in conjunction with machine tools our outlay of manual activity continues to be too high. Setup work, quality control, loading and emptying the tool magazine still on the average take too much time.

It is only by automating these latter functions that it will be possible to achieve minimal operator operation during at least one shift. Thus in the construction of machine tools there arises the problem of developing and supplying to clients manufacturing concepts involving a high level of automation and integration. Today manufacturing cells and flexible manufacturing systems for processing rotationally symmetric and also prismatic parts are being employed in the most varied areas of the metalworking industry. Examples of this are the FCW 500 and 800 manufacturing cells. Here the predominantly process-specific and process-flexible robot technology is an integrated component of the machine tool. In addition, such manufacturing cells possess equipment guaranteeing quality control and process surveillance sufficient to get through at least one shift without the intervention of operators. These manufacturing cells have been developed in joint efforts by the Machine Tool Research Center and the machine tool combines "Fritz Heckert" and "7th October." They make possible an increase in labor productivity to 200 percent. At least three workers per manufacturing cell can be gained for other activities. In addition, auxiliary time (setup, tool magazine loading and emptying, etc.) have been reduced by one-half.

During recent years in GDR machine construction there have been created a number of similar manufacturing cells and manufacturing systems. This includes also those which are used in processing rotationally symmetric and prismatic parts in the "Herbert Warnke" Erfurt VEB Metalworking Combine as well as those employed in the Magdeburg "Karl Liebknecht" Heavy Machinery Combine manufacturing diesel engines and industrial equipment.

Oriented Toward Complex Applications

In conjunction with the "Fritz Heckert" and "7th October" Machine Tool Combines the Research Center for Machine Tool Construction is concentrating on the complex employment of robots in conjunction with flexible manufacturing systems. This includes the development of machine-feeding robots and a corresponding periphery for manufacturing cells. It also includes robots for the transport of workpieces and tools between processing stations and it likewise includes software for the control of all processes associated with these activities.

Socialist rationalization and automation is accomplished by the people for the people. And that applies in its broadest sense to the use of robot technology. Our experience has confirmed that it pays off in many respects to maintain close involvement of the workers themselves even in the preliminaries to robot employment and during studies relating to the most effective use of robot technology. Their knowledge and experience is indispensable in securing a high degree of the economy and extensive improvement in working conditions within the complex. Besides this, the industrial robot data bank of the GDR, located in the Research Center for Machine Tool Construction, is at the

disposal of all combines and factories for use in carrying out extensive groundwork preparatory to their own in-house engineering solutions. In this data bank there is stored information regarding all essentially important applications of robotics. Thorough preparatory work is an indispensable prerequisite to the full exploitation of this highly productive technology.

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GERMAN DEMOCRATIC REPUBLIC

CAD/CAM SYSTEMS FOR IC DEVELOPMENT, MANUFACTURE

East Berlin EDV-ASPEKTE in German No 2, 1985 (signed to press 19 Feb 85) pp 52-55

[Article by Prof Dr Horst Elschner, Prof Dr Albrecht Moeschwitzer, Dr Albrecht Reibiger, Dresden Technical University; bracketed numbers refer to bilbiographical entries]

[Text] 1. Overview

Highly developed computer-aided processes are needed for the development of basic technologies, as well as for the designing and manufacturing of modern ICs. This article introduces some selected program systems which were developed entirely or in part by the applications and research group for electronic circuits at the Dresden Technical University. This group is under the components and systems department of the information technology section.

Fig. 1 provides an overview of the classification of the computer-aided methods which are of particular importance at the R&D stage and also in the planning and implementation of the manufacturing process (boxes with dark, heavy outline). Also included are additional essential program systems, among others those for production control and organization (including quality control) which will not be discussed in this article.

Characteristic of CAD/CAM microelectronic systems are the extremely stringent requirements in terms of computer technology and the processes to be used [1 to 3].

In process and component simulation, non-linear partial differential equation systems for complicated local two- and three-dimensional problems must be solved--most often also in dynamic simulation.

In a network simulation, very large non-linear standard differential equation systems must be solved. The layout software requires among other things that huge amounts of data be processed effectively.

The processes used and the sequence in which they are used naturally depend on the objectives involved. For the development and optimization of basic technologies and components and of basic ICs or standard cells, but also usually

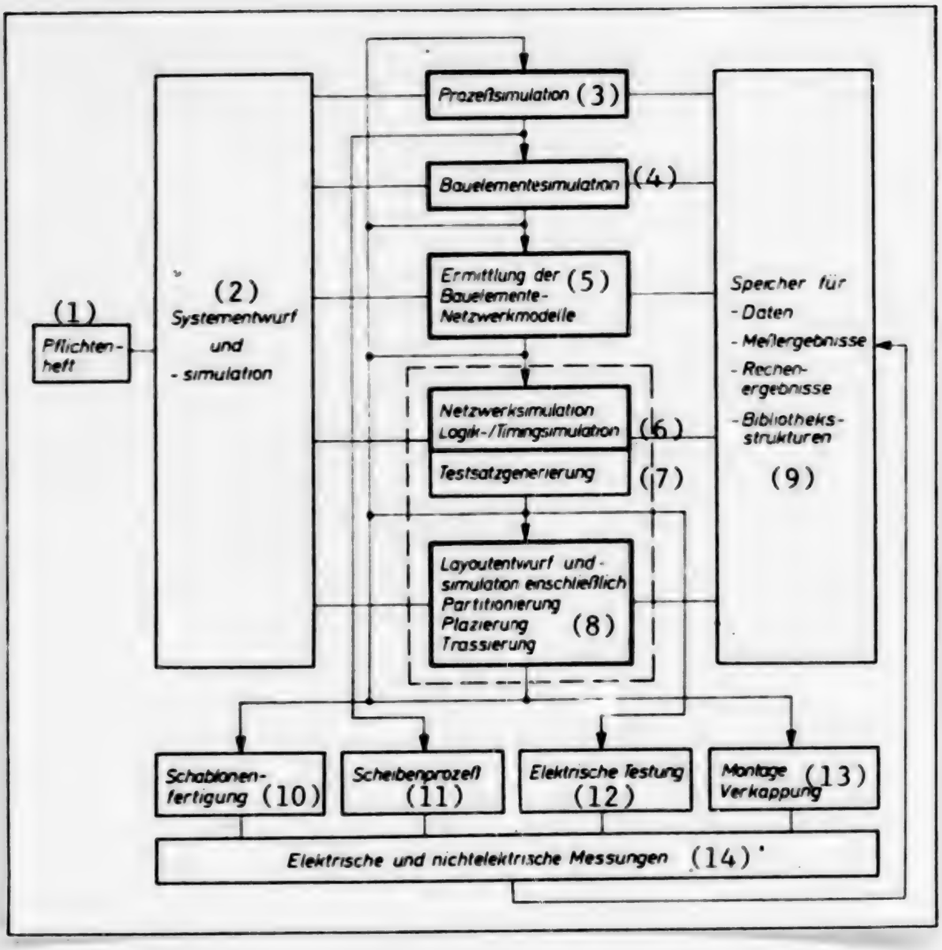

Fig. 1 Classification of Design and Simulation Methods in IC Fabrication

Key:

1. Performance specification
2. System design and simulation
3. Process simulation
4. Component simulation
5. Determination of component/ network models
6. Network simulation Logic/timing simulation
7. Test set generation
8. Design and simulation of layout including partitioning, placement, path plotting
9. Memory for
   - data
   - measurement results
   - calculation results
   - library structures
10. Template production
11. Slice process
12. Electrical testing
13. Assembly, encapsulation
14. Electrical and non-electrical measurements

for the development of new types of standard and custom ICs and master slices for semi-custom ICs, it is preferable that the complete sequence from process simulation to layout simulation be performed. The design of semi-custom ICs or gate arrays, on the other hand, frequently begins with a computer-aided or manual design of the system, followed in the case of digital ICs by logic and hybrid simulation, test sequence generation and layout processing (within dotted line in Fig. 1).

Most of the program systems given in Fig. 1 are essential for design and manufacture. They also contribute to optimization, increased yield, reduced test runs and the preparation of strategic decisions with regard to subsequent generations.

2. Process and Component Simulation

o PROSIM Program System

PROSIM, for local two-dimensional simulation of the semiconductor technology process, makes it possible to simulate individual process steps or process sequences and to create input data for the component simulation.

Ion implantation, predeposition from the gas phase, diffusion in inert and oxidizing atmospheres, etching and film precipitation (SiO_2, Si_3N_4, poly Si, varnish) are implemented. Also taken into account are concentration-dependent diffusion coefficients and the varying Si/SiO_2 interfaces with different dopants [3 to 5].

o PROSIM/ZANMOS/ZANDAT Program System

This program system for local two-dimensional process and component simulation makes it possible to do a complete simulation from the structural and process-related parameters to the internal component electronics to the formation of network models, preferably of MOS and CMOS circuits [4].

Based on the doping profiles and surface and film topography, which are calculated using PROSIM, ZANMOS calculates the terminal currents, capacitance, potential distributions and charge carrier distributions as a function of the applied terminal voltages, using a two-dimensional numerical solution of fundamental semiconductor equations (continuity, transport and Poisson equations). The ZANDAT program makes possible a comprehensive evaluation of the results:

- MISMOD calculates the parameter vector of a network model through optimization

- HOTEL calculates the effects of hot electrons

- HFPARA calculates the parameters of the high frequency equivalent circuit diagram

- ZANPLOT provides a multi-dimensional printout of the profile patterns.

Using PROSIM/ZANMOS/ZANDAT, essentially all of the technically interesting effects involved in KMOS and CMOS circuits can be analyzed, simulated and modelled, e.g. non-planar surface, taper region, analysis of punchthrough and weak inversion currents. These effects can then be included in a 10-parameter network model [2].

o PROSIM/ZANAL Program System

ZANAL, for process and component simulation, is a program system for local two-dimensional and sometimes also quasi three-dimensional simulation of the behavior of overall semiconductor structures, preferably for bipolar structures.

When coupled with PROSIM and the TRANSMODEL program system, a complete simulation, from process simulation to component simulation to component modelling for network simulation, is possible. Depending on the component structure, doping profile, material characteristics and boundary and initial conditions, ZANAL calculates the distribution of the potential, hole and electron density, and the parameters to be drawn from them, such as contact currents, current density, field strength, quasi Fermi level, etc.

As boundary conditions, doping windows, metal deposition, Schottky contacts, oxide surfaces, MOS transitions and symmetry surfaces are possible at all boundaries.

The simultaneous algorithm developed as a solution in the non-linear, partial digital system of the internal electronics is characterized by good convergence and stability and is thus also suitable for high-injection and avalanche breakdown pipolar structures. In addition to bipolar structures, MOSFET, SFET, SIT and CCD, and others, were calculated [6, 29 and 30].

o QUASAL and QUADRA Program Systems

These systems provide local quasi two- and three-dimensional simulation, respectively, of planar bipolar transistors [7 to 9].

o SOPHIA Program System

Local quasi three-dimensional simulation of I^2L components.

To be emphasized is that SOPHIA makes possible an effective simulation of complex I^2L structures, e.g. with 20,000 points, and a synthesis of the horizontal geometry [10 and 11].

o SIMBA Programming System

Local three-dimensional simulation of semiconductor components.

Application was for bipolar transistors (e.g. with 8000 points) and c-Si solar cells among others [12].

o SEMICO Program System

Applied to local two-dimensional simulation of GaAs components [13].

3. Network Analysis and Logic Simulation

3.1 General Network and Logic Simulation

In developing programs for analyzing large-scale non-linear networks in our section we used the general network analysis program DELPHI [14]. It permits the calculation of operating points, gate current/voltage characteristics and transfer characteristics of non-linear resistive networks, the calculation of frequency characteristics of linear dynamic networks and the calculation of transients in linear and non-linear concentrated dynamic networks. Sensitivity functions can also be calculated for all these characteristics. DELPHI also permits optimization tasks to be handled for dimensioning network parameters. With the aid of the expansions described in references 15 and 16 in the bibliography DELPHI can also be used to analyze resistive networks with retrograde characteristic curves or to calculate transients in non-linear dynamic networks, which comprise non-linear concentrated subnetworks and linear non-concentrated subnetworks.

Although DELPHI was conceived initially to assist in the computer-aided design of electronic and microelectronic circuits, it can also be used to analyze network models of mechanical, pneumatic, hydraulic, thermodynamic and other systems (see 17 in bibliography, for example). The programs developed for DELPHI for solving linear systems of algebraic equations with a sparse coefficient matrix, for the numerical integration of algebraic differential equations and for symbolic differentiation in calculating the elements of the Jacobi matrix, have been subsequently used in a number of additional programs including the network analysis programs STADYNET [2 and 18], MISNET [19] and ILNET.

The MISNET and ILNET programs are tailored specifically for analyzing MOS and I^2L circuits (see also 3.2 below).

ACRA is a program for analyzing linear networks in the frequency range. It makes it possible to calculate the usual frequency characteristics including group delays and parameter sensitivities. ACRA can also be used to perform a noise analysis in which correlated noise sources can be taken into account [20].

The DYLOS program has been developed to provide an effective dynamic logic simulation. DYLOS is based on a new kind of algorithm for an event-oriented, 3-digit dynamic averaging simulation with continuous time. Using this program it is possible to assign to each gate different delay times of any magnitude for signal rise and fall. Moreover, these delay times need not be whole-number multiples of a certain micro clock pulse [21].

3.2 VLSI (Very Large Scale Integration) Network and Logic Simulation

MOS/CMOS technology predominates in VLSI. VLSI for such circuits is based on transistors and not on gates [2].

Therefore, LSINET for transistor-based logic simulation and MISNET III for transistor-based dynamic simulation were created.

Input into LSINET and MISNET is also via an NET file or directly from a network extractor (LSISIMULATOR, see 4. below).

The steps involved in logic simulation are given in Fig. 2. Logic simulation can be used to analyze circuits with up to 150,000 branch elements. In addition to static, transistor-based logic simulation, it is also possible to perform a timing simulation (simplified dynamic network simulation [22]) using LSINET.

Special services such as graphic gate displays complete the system. MISNET III provides for dynamic network simulation of critical paths up to 200 transistors in VLSI circuits. MISNET III is based on node voltage analysis and like all high-performance network analysis programs uses the GEAR algorithm for integration of the differential equation system and the sparse matrix technique for solving the system of equations. In MISNET the network models for MOS/CMOS analog and digital circuits which are of greatest practical importance and which are obtained from MISMOD (see 2.2 above) can be called up using key words. This includes a 10-parameter model which takes weak inversions and punchthroughs into account [23].

3.3 ILSIM - An I^2L Simulator

Using the library functions supported by the system, the circuit to be developed can be added to successively from the bottom up. The selection can be made between logic simulation (LOGSIM) and calculation of static node potentials with subsequent transient analysis (ILNET).

ILSIM is part of a CAD system which also includes ILPOS and ILTOP (see 4. below) [24].

Layout Design and Simulation

The most elegant form of computer-aided layout design for integrated circuits is the silicon compiler.

Using CALMOS, a silicon compiler was created for NMOS circuits. As with LSINET/MISNET, an NET file serves as the input. The CALMOS silicon compiler then automatically generates the layout of the corresponding NMOS circuit. CALMOS also permits hierarchically organized data input [27].

The LSISIMULATOR was created for layout verification and network extraction.

Using this program system it is now possible to perform a layout rule check and a network extraction for circuits up to about 5000 transistors from the layout file (polygon-based) via a bit pattern file [27].

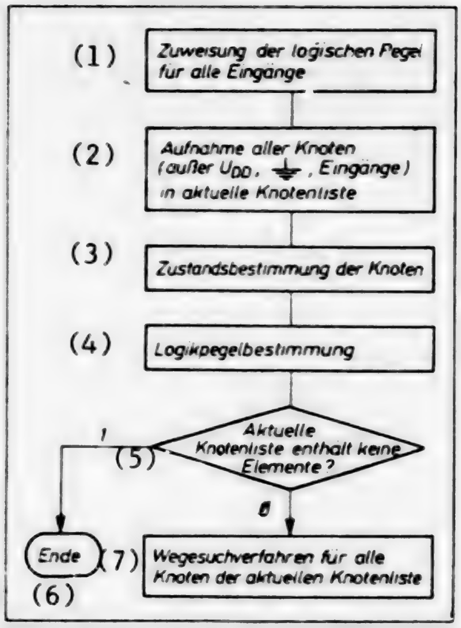

Fig. 2 Flow Chart of Logic Simulation Using LSINET

Key:

1. Assignment of logic levels for all inputs
2. Acceptance of all nodes (except U_{DD}, , inputs) in updated node list
3. Determination of node status
4. Determination of logic level
5. Updated node list contains no entries
6. End
7. Routing method for all nodes on updated node list

The ILPOS 3 program system allows the designer to construct a symbolic layout especially for the I^2L circuits (see also 3.3 above). The basis of the data is the list of transistors and information on the location of the external connections.

Based on this symbolic layout ILTOP 2 automatically generates the detailed layout [25, 26].

5. THEMIS Program System

This system provides for three-dimensional static and dynamic thermal simulation of integrated circuits and similarly structured arrangements.

The area of analysis is the semiconductor chip and its mounting. Given certain heat sources, the temperature range or the coupling elements between any sources and test points are given. A number of special algorithms permit an effective solution to the local three-dimensional partial differential equation.

The thermal coupling networks can be processed in the input regime of standard network analysis programs [28].

6. Conclusion

Program systems have been presented for local multi-dimensional static and dynamic process and component simulations, for network, logic and timing simulations, for layout design and simulation (including that of a silicon compiler), and for the thermal simulation of ICs. Of increasing importance regarding requirements of VLSI technology and the increasing importance of semi-custom ICs, are the coupling of program systems (i.e. complete systems), highly effective processes as a prerequisite for cost-effective routine uses, as well as design software which, on the basis of proven technology and/or standard cells, allows direct conversion of a function into the layout. This makes the design process more effective and at the same time takes into account that there is an increasing number of designers in the industry who use the knowhow of the IC manufacturer via the software without having to know all the details.

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GERMAN DEMOCRATIC REPUBLIC

MACHINE TOOL COMBINE'S LEVEL OF AUTOMATION ASSESSED

East Berlin FERTIGUNGSTECHNIK UND BETRIEB in German Vol 35, No 6, 1985 pp 326-328

[Article by Dr B. Zeidler, Chamber of Technology, Karl-Marx-Stadt VEB "Fritz Heckert" Machine Tool Combine: "Computer-Aided Production Preparation and Manufacture in the Head Factory of VEB 'Fritz Heckert' Machine Tool Combine, Karl-Marx-Stadt"]

[Excerpts] 1. Higher Demands Placed Upon Organization During Production Preparation and Production Performance

The economic goals to be attained in the plants and combines of machine tool construction during the prospective period of our economic plan and the resulting economic growth in performance can be secured only through the complex liberation of the forces of all labor-intensification factors and all factors of qualitative growth. In this connection great importance attaches to the complex enhancement of the level of organization within all decisive phases of the production process. This is side by side with renovation of facilities and equipment up to a higher scientific-technical level, a profound reprofiling of the product spectrum, and a thorough improvement in the level of the technologies and processes employed.

Thus, for example, the further achievement of high rates of increase in production under the pressing influence of scientific-technical progress leads to a steady growth in the masses of information which must be managed in the individual phases of the production process and also to abrupt leaps in the complexity and dynamics of the manufacturing processes which can be effectively dealt with only through extensive rationalization and intensification in these areas.

Thus, e.g., in the domain of design and technological activities preparatory to manufacturing in the parent plant of the "Fritz Heckert" Combine, it is necessary at all times to administer and to keep up-to-date about 110,000 "piece list" positions for about 8,000 design components and about 28,000 manufacturing technologies. Annually, on an average, it is necessary to derive data for about 30,000 parts manufacturing contracts in terms of assortment, quantity and schedule. It is also necessary to set up the corresponding required manufacturing staff and to continuously manage a manufacturing

inventory of about 27,000 manufacturing contracts. Further examples of the quantities of information which must be dealt with are the annual determination of the material purchase order requirement for about 25,000 material positions including its continuous updating in the face of short-term reassignments and not least of all management of the bookkeeping for about 20,000 material movements monthly for approximately 40,000 inventory positions. Here through rational and high-quality information processing a decisive contribution can be made throughout the entire area of production preparation, production supervision and cost accounting toward improved efficiency of supervisory and planning activities and especially toward rationalization of routine jobs.

Organization, as an intensification factor, has further decisive importance in the intensification of production as a result of optimal organization of primary and auxiliary processes. The shortening of product throughput times and thus the reduction of manufacturing inventories, the reduction of shutdown times and maintenance times, coordinated delivery, on time and in proper quantity and assortment, of individual manufacturing stages depend directly upon the level of organization within the processes of manufacturing preparation and manufacturing guidance.

Effective organization of the sequence of processes is necessitated not least of all by those modern techniques, technologies and procedures which are employed within the context of complex rationalization. The achievement of integrated manufacturing segments, the use of robotics or of modern techniques for the rationalization of auxiliary processes directly compel the achievement of a level of organization on a par with these techniques and technologies. An example of this is the achievement of a modern type of overhead shelf storage in the FHK ["Fritz Heckert" Combine] for storing all pallet-borne in-house manufactured parts as well as purchased parts and standard parts used in the factory. It is significant that in the case of a storage system of such dimensions as to involve about 40,000 positions requiring storage and about 27,000 storage locations subject at the same time to variable storage site specifications it is no longer possible to manage storage processes using conventional organizational devices and methods.

It has been only computer-supported organization of the processes of stock-storage assignment simultaneously employing dialogue on the basis of a monitor screen which has provided an approach to this problem and has at the same time been a classic example of the direct connection between technology and organization and of the need to preserve their unity [1].

2. Complete Automation of Information Processing--Its Present State of Development

Starting from the situation which has been described above, in recent years there have been planned and carried out in the parent factory of the FHK an extensive system of EDP application supporting almost all phases of the production process and yielding a decisive contribution to production intensification, rationalization of management and planning and also to a considerable reduction in the number of routine jobs. This has resulted in a further rise in performance.

The main complex of this system consists of computer methods applied to design and technological preparatory stages of manufacturing, data processing approaches to the management of technical documentation in the factory, to supporting materiel-economic processes, to intermediate-term production planning, to the rationalization of short-term planning and control of production sequences and not least of all to machine management of the cost-accounting processes of the plant. The basis of this EDP system is a mainframe computer installed centrally in the factory, decentralized small computers or office computers installed in the research and development departments and in the area of technology/rationalization. There is also the process-computer system installed directly in the production area for controlling the primary and auxiliary processes of production.

There may also be mentioned here the installation of a monitor system involving 24 monitor workplaces in the domains of research and development, technology, materiel economy and manufacturing assignment. Through these monitors the workers in the listed domains have immediate nearby access to the data stored in the mainframe computer. This access is via interrogation or through complete acquisition of the data [2]. The overall system is subdivided into nine data processing complexes each involving several highly integrated data processing projects. The overall system is characterized by about 1,000 programs involving about 600,000 machine instructions just for those operations which are in progress on the plant's mainframe computer. The running of these programs fully occupies the EDP system in polydepartmental work (using a DOS operating system with a sliding charge system and power) throughout a 7-day week and with a multifactor averaging 2.8.

It can be estimated that with the total system which has been described it has been possible to achieve effective engineering approaches in production preparation and production performance within the parent plant of the FHK. The use of this system played a decisive role in carrying out the formidable plan-tasks of the factory in recent years. Despite these positive results it must nevertheless be asserted at the present time that in some areas this necessary development is only in its initial stage.

3. Focal Points of Further Development

Two main problems occupy the foreground: first of all, international developments in the area of competition and sales and likewise the effects of scientific-technical progress worldwide are leading to an increasing degree to an enhancement of product innovation and product quality. Along with these there is also an increase in the ability to react quickly to customer demands for special designs in the shortest possible contract fulfillment times. This necessitates additional decisive rationalization especially with respect to the processes of preparatory design and preparatory technology. This further rationalization is achieved through computer-supported engineering approaches having a broad range of applicability and complex integration with methods of organizational manufacturing preparation and process control.

Secondly, as is well known international developments in machine tool construction, under the pressure of continuously rising productivity and, in

particular, of increasing flexibility of manufacturing facilities, is leading step by step from workplace automation to process-related automation. That is to say, the development of production technology is characterized by automatically functioning units which to an increasing degree are self-monitoring. These units manufacture various assortments of parts with high productivity and precision; they are electronically controlled in minimal operator operation independently of manual intervention over several hours or shifts.

An expression of this is the rapidly growing use throughout the world of processing centers, manufacturing cells, technological units involving industrial robots and the thus far higher stage of automation, namely flexible manufacturing systems.

The achievement of minimal operator and at times even totally unmanned operation gives rise to such problems as the following: automated workpiece changing and workpiece storage, autonomous tool changing in response to job change or wear, fault diagnosis or error detection together with total automation of process control and process surveillance. These lead to major changes in manufacturing technique itself. The technology of automation and, in particular, microelectronic computer technology and control technology to an increasing degree are leaving their mark on the products of machine construction and hence on the manufacturing process itself in machine construction. One might perhaps say that the trend now taking place internationally toward direct computer control of automatic flexible manufacturing equipment is a step in process development which is as momentous as that which took place in the sixties from conventional to numerically controlled machine tools.

In summary, it is clearly evident that the automation of information processing by means of computer technology and control technology on the basis of microelectronics will play a key role and possess dominant importance in meeting the challenges of the coming years. The complete integration of these techniques and technologies into all factory processes (CAD/CAM) is one of the most important accelerating factors in opening up the production reserves of the eighties and will be the basis of automated machine construction in the nineties.

4. Efficient Hardware and Software as Fundamental Prerequisites

The implementation of the strategy of complex rationalization and thorough automation is necessarily possible only when there is available efficient computer technology corresponding to the specific requirements of individual areas and it especially depends upon the development of software.

In the domain of hardware an efficient apparatus is available in the computers of the ESER series 1 and 2 for dealing with the tasks of central data processing. For the tasks of preparatory design and technology as well as of process control and for decentralized close-to-the-job-site computer operations associated with these tasks a major step forward has been taken by securing the KBR A6402 and the AKT A6454 together with corresponding peripheral graphics devices together with office computer technology--all supplied by the VEB Robotron.

With regard to the software problem the plant will face formidable problems in the coming years. Thus, for example, the creation of software for the achievement of automated flexible machine systems constitutes a complex of tasks which because of the cost involved and because of the involved complexity of the necessary engineering approaches is a task of previously unknown magnitude in the use of computer technology and control technology. This is clearly to be seen especially in the estimated international expenditure of roughly 80 to 100 man-years for software packages in flexible machine systems. The following focal points are discernible in dealing with software problems in the factory:

i. Existing problems and their importance for the further development of efficiency necessitate a decisive increase in software capacities within the factory. In this connection one proceeds from the principle that this can be achieved both via the intensive route through improved performance on the part of research and development personnel and also extensively through reprofiling among other groups of workers. But in every case nevertheless this must be done within the framework of the approved worker-assignment plan of the factory.

In setting up these software collectives one must bear in mind the increasing significance of expenditures for software maintenance which today internationally in the case of large systems is known to be taking up over 65 percent of software capacities.

ii. The building up of software capacities must take place not only in the realm of organization and data processing but especially in the domain of research and development aimed at product development and its rationalization. At the same time it must take place in the technical domain to deal with the tasks of process automation and the rationalization of preparatory technology. It must also take place as applied to the decentralized use of computer technology.

iii. For specific applications corresponding centrally developed software approaches must be created in adequate scope as a basis for foundation for the development of user software.

Special focal points here are appropriate basic software for rationalizing preparatory design and technology and here in turn special importance attaches to corresponding basic graphics software. A further focal point is the coordinated creation and supply of suitable multivalently usable components for dealing with those tasks of flexible automation which have been described.

iv. Finally, as a fourth focal point it is necessary that software development shall be accorded a substantially greater role than hitherto in training and continued education in our advanced schools, technical schools and other centers of education and continued education. Besides the obvious training of computer science specialists in appropriate fundamental studies, this also involves especially a process of familiarizing students in science and economics with the problems peculiar to automated information processing.

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GERMAN DEMOCRATIC REPUBLIC

IMPLEMENTATION OF COMPUTER-AIDED PRODUCTION SYSTEMS DETAILED

East Berlin FERTIGUNGSTECHNIK UND BETRIEB in German Vol 35 No 6, 1985, pp 329-331

[Article by Dr G. Zemann, engineer, Chamber of Technology, Erfurt VEB 'Herbert Warnke' Metal-Forming Combine: "Experience and Knowledge Gained in Developing and Introducing Computer-Aided Technical Planning and Organization in Production"]

[Text] 0. Introduction

At the head offices of the Erfurt VEB 'Herbert Warnke' metal-forming combine, the material and technical basis of production has been continually expanded and modernized. Today nearly every fifth machine tool involved in primary production is an NC (numerical control) or CNC (computer numerical control) machine. Complex, automated technological solutions, e.g. the cutting and precise machining of flat plate-type components in the production of large welded machine assemblies, can stand up to a comparison with corresponding technologies of any manufacturer in this branch of industry.

At a certain technical level software packages developed during the past 15 years with available technology cover many different areas of application, such as graphics capability for design-related and technological problems, database systems for managing technical source data, interactive work stations for complex planning and balance sheet models, process data systems for production control problems and many more.

Since the first electronic data processing systems were introduced at the end of the 1960's production volume has increased five times. Two generations of metal-forming machines have been added in the meantime.

1. Increased Scientific and Technical Demands

In this combine the range of components and assemblies is twice as large as it was at the beginning of the 1970's. While years ago a production program involving much planning was able to be set forth with little revision, today, as a rule, up to 50 percent of the items in the production plan defined at the beginning of the year change in terms of deadlines or content.

In the relatively short time period of the past five years an increasingly rapid qualitative transformation has taken place.

- o Complex technical solutions are increasingly taking the place of individual machines.
- o The series-produced nature of machine production is declining while the number of very special products and/or largely custom-made adaptations is growing from year to year.
- o Delivery times are becoming shorter.
- o Due to this development the rate of renewal is currently about 30 percent.
- o There has been a qualitative change in the content of a modern machine in comparison with the former technology.

New requirements in terms of research and development, production planning, quality production and marketing, which are linked to these changes, coincide with increases in the division of labor in production, increasing demands for accelerating transshipments of goods and changing socioeconomic conditions.

NC technology provided new ideas for the configuration of complex computer-aided systems. The first continuous-path control oxygen cutting machine was used in the plant in the first half of the 1960's. In the meantime there are about four such work stations where each year 200,000 to 250,000 flat components of varying shapes for welded steel constructions are produced in their entirety from about 8000 sheets of metal.

These machines were integrated into a semiautomated sheet metal processing, transporting and storage system. The oxygen cutting process and programming methods were further improved, e.g. with the introduction of precision cutting under high gas pressure and the installation of a computer-aided work station with graphics display for interleaving within the sheet-metal plan and for preparing numerical control programs.

Even with the first NC oxygen cutting machine it was necessary to have a digital description of the geometry of the part to be cut from the metal sheet. Difficulties arose due to the great number of calculations involved when it was necessary to turn and shift parts from their normal positions in order to interleave the various components in the sheet-metal plan in the interest of reducing material waste. For greater control the programmed components and sheet-metal plans were drafted with a computer-aided drafting machine.

Therefore it is advisable that the digital representation of the individual part be made, if possible, during the design-phase of the welded assembly in order that interleaving of the parts in the NC oxygen cutting plans and programming of the cutting process can be realized immediately without having to go through intermediate organizational steps on the computer screen in a graphic dialog with this digital representation of the geometry.

NC welding robots make possible a thorough CAD/CAM concept for the production of large-scale welded assemblies beginning with the design and configuration, taking into account the technological conditions of its manufacture, and ending with the final assembly.

Within the scope of the available technical resources for production planning and for the manufacturing process, this conception has been and continues to be realized and completed in step-by-step fashion. The original concept of technological production planning for NC oxygen cutting machines was able to be realized with the introduction of the first digital graphics-display computer at the end of the 1970's.

At the same time the first practical experience with graphic data processing was obtained.

A more far-reaching consideration deals with the fact that the external geometry of the welded machine frame of a press is essentially determined by the dimensions of the tool space and the mechanics of the power flux from the drive to the slide and over the piece.

Following this line of thought, programs were developed for providing a digital graphic simulation of the dynamics of lever drives. This shows the effective fields of force for an optimum configuration of the machine frame and the drive components. Using a finite-element model, currently being worked on, the effects of machine mechanics can be applied by computer to the configuration of the machine frame and its dynamic components and assemblies.

A second incentive for designing a complex CAD/CAM solution was the need to raise the plant's planning, job development and production control systems to a higher level.

3. Experience and Knowledge Gained in the Introduction of Computer Technology

In deciding upon the first use of an electronic data processing system, the argument was presented that the known limits of the available technology did not justify this step and that a computer more suitable for realizing the objectives which had been set ought to be installed at a later date.

Experience has shown, however, that only by doing concrete work with accessible technical resources was it possible to introduce the necessary modifications, obtain the required knowhow about how to proceed, arrange the necessary resources in terms of expertise, materials and manpower, and create the necessary organizational framework.

Today analogous problems exist in another form in configuring computer-aided systems for design and technology using interactive, graphic, computer-aided work stations. Progress in this direction can only be achieved with a practical approach to these technologies. Possible steps to be taken are determined largely by the knowhow already achieved. Investment decisions must take this factor into account. Also of decisive importance is ever increasing cooperation with the VEB data processing combine. The level of software development which has been achieved today would not be possible without the resources of this combine. Thus it has proved advantageous to have had data processing specialists available in the plant itself who were able, within the scope of the overall concept established, to work with the technical departments toward meeting objectives which were demanding in terms of content and

technology and to integrate into their own plant's organization the programming solutions developed by specialists from the data processing combine.

Advanced schools, facilities run by the academies and industrial institutes play an important role in software development. There are close working relationships and/or firm contracts based on joint performance specifications with Dresden Technical University, Wilhelm-Pieck University in Rohstock, Friedrich-Schiller University in Jena, Magdeburg Technical College, the Academy of Sciences, and in particular with the Institute for Computer Technology, the research centers for machine tool construction and automotive engineering, the Central Institute for Welding Technology in Halle, the Main Center for Applications Research of the Data Processing Combine and the plants of the data processing combines in Erfurt, Leipzig, Gera and Schwerin.

Not only data processing solutions were developed within the scope of these working relationships--also included was theoretical advancement of scientific facilities in various technical areas for evaluating in the various technical areas [as published] in the plant. This experience is of fundamental importance in evaluating data processing technologies as a link between scientific research and a new quality of industrial utilization.

In order to increase the personal responsibility of the user, the deployment of technical equipment and software specialists was in part decentralized and placed under the direction of the user.

The basic principle of the personal responsibility of the user for his applications software does not exclude the increasing importance of centrally developed user modules, partial solutions related to assembly and expansion, efficient basic solutions, e.g. for database and computer network technologies, as well as basic multi-purpose software.

The way in which user software approaches the process involved determines the different ways that it can be used subsequently.

4. Problems of Economic Utilization of the EDP Solution Developed

One problem involved in the economic evaluation of complex computer-aided systems is the process-related nature of its configuration and realization. Computer-aided systems are developed in tandem with the processes of increasing production and effectiveness and modifying internal structures. The results of the step-by-step process of configuring complex computer-aided systems are applied immediately in the form of adaptations to altered and/or more stringent performance conditions and can therefore only be established over a long period of time based on a comparable reference.

What is essential is that complex data processing solutions are directed toward the qualitative properties within the production processes, such as the extent to which the process can be planned, production continuity, flexibility, readiness for delivery, development risks, etc.

The speed with which complex computer-aided systems can be implemented and their effectiveness are largely determined, among other things, by:

- o the influence of economic, organizational, personnel-related and other constraints
- o social, sociological and organizational requirements in solving questions concerning the degree of capital replacement
- o at what speed and to what extent new, much more demanding theoretical, working and organizational models can be implemented
- o the preliminary work required in incorporating mass data systems at a high level of automation
- o high work quality demands during production planning
- o questions of potential in terms of software development and questions of the level of technology to be used
- o management questions

Among other things, it is to a large extent the nature of complex solutions at totally new levels of technology that:

- o labor relationships and hierarchies which have developed traditionally must be reconfigured
- o the ways in which the division of labor has proceeded historically must be reorganized
- o labor requirements and responsibilities must be newly defined.

5. Stringent Requirements in Terms of Management Activities

With complex computer-aided solutions come far-reaching changes in the way work is accomplished. These changes cannot be limited to individual structural areas or individual areas of responsibility. Due to the necessary broad structuring of tasks and responsibilities according to specific job content and the degree of integration required by complex data processing solutions as the result of a deeply rooted division of labor, conflicts as to objectives do arise. The individual questions, individual tasks and requirements concerning the implementation of complex computer-aided solutions which arise in this connection, primarily represent the results of new information processing technologies at the level of specialized fields and are posed against the backdrop of the historical view of these tasks and responsibilities. The results are coordination problems and loss of time which can place a valid overall concept in question. These problems, subjective in nature, place great demands on the process management in implementing complex computer-aided solutions.

Of decided importance in this regard is the first level of management over the technically specialized structural units. The strategy of complex systems must be defined, decided and implemented at this level. Correct ordering of tasks according to specialized area can only be accomplished based on knowledge of how each area's function interacts with the overall system. This requires comprehensive information on such interrelationships. In order to support this process, a consultation base was established in the head offices in which the overall complex computer-aided system is clearly documented.

6. Focus on Development and Application of CAD/CAM

In developing additional CAD/CAM solutions the focus is on several main areas:

- Computer-aided solutions in metal-forming machine construction. Within the scope of these requirements, additional modules are being developed for the CAD/CAM system for welded structures. This includes finite-element models for structural assemblies based on the dynamic loads on the drive and lever systems in the working cycle of a press stroke, etc.

- CAD/CAM solution for machine tool construction. In the decision to deal with this topic the assumption was that modern metal-working technologies for the efficient and flexible manufacture of large tools could only be realized by employing complex CAD/CAM systems. Thus, areas in tool construction with complex curves, for example, require a complete digital representation of this geometry within the data processing systems in order to be able to program the NC technology to be used.

- CAD/CAM solution for machines used in the plastics industry. Within this complex group of tasks the focus is first of all on the manufacture of worm gears and cylinders as assemblies which determine how extrusion systems and injection molding machines function.

- CAD/CAM electronics for increasing efficiency and ensuring increased performance in drafting and constructing electronic and electrical controls.

7. Concluding Observations

The following conclusions can be drawn in evaluating the experiences to date in the development and uses of complex computer-aided solutions:

- In this combine and the plants within it, integration of modern information processing systems into the research and development, preparation, planning and control areas of production must be accelerated. The speed with which this problem is solved is of central importance in controlling changing conditions in terms of capital replacement, particularly with regard to high rates of renewal in the streamlining of products, exports and production itself, as well as in implementing improvement strategies and modernization concepts. Designs of additional complex computer-aided systems require long-term conceptualizing at the plant and at the combine level--these requirements are of central importance in terms of planning and financing the development of hardware and software.

- CAD/CAM technologies are key technologies. Integral software potential is necessary for their step-by-step development and implementation, always interleaved with further developments in the complex capital replacement process. In order to ensure the availability of the necessary experience, different software resources within the complex with its different kinds of equipment must be developed and coordinated with the necessary equipment technology in the combine and in plants within the combine. The necessary advances in terms of experience for the plants within the combine are to be ensured through efforts at the head offices.

- Proven software systems must be analyzed in order to select available models, algorithms and programs and include them in broad-scale subsequent use. Available advances in terms of experience and advances in terms of software development must be made accessible through differentiated strategies of maximized subsequent use by the plants.

- Cooperation among the advanced schools, academy facilities, industrial research centers and the data processing combine must be further expanded and intensified.

- In all plants, targeted measures involving training and continuing education must be planned and implemented in order to permit access to the available technical and engineering potential of CAD/CAM technology in accordance with its value. Skilled personnel with specific training in integrating CAD/CAM solutions must be gradually introduced into research and development departments, design offices, planning facilities and technological departments.

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GERMAN DEMOCRATIC REPUBLIC

COORDINATION OF OFFICE COMPUTER INTEGRATION OUTLINED

East Berlin in RECHENTECHNIK-DATENVERARBEITUNG in German Vol 22 No 8, 1985 p 1

[Article by Prof. Dr. Wolfgang Schoppan: "Managerial Tasks for the Development of Office Systems"]

[Text] In this issue of RECHENTECHNIK-DATENVERARBEITUNG a few basic statements on communication and office automation will be discussed that take particular consideration of network systems. In this connection, it must be emphasized that the responsibility for office organization and office systems is linked, in terms of managerial organization, with the responsibility for the use of automated information processing. The present organizational trisection: data processing, telecommunications and office automation, must also be integrated, on the part of management, according to efficiency, thus allowing for the greatest possible consideration of productive units. When developing the concept, the potential user must be taken into account from the start. Specialization of responsibility according to device types or specific systems--which might well have been appropriate for applications engineering of earlier electronic data processing installation--will not stand the test. Rather, it is general technical design and applications engineering that play a much greater role as prerequisites for successful office systems design. And who will perform these tasks? The integration of data processing, telecommunications and office technology into a complex, integrated office system requires corresponding coordination. Given the latest trends, it would be best performed under the auspices of the directorships for organization and data processing in the combines and enterprises. The demand for integration originates chiefly from the structure of the office workstation, in the broadest sense of the term. The majority of existing office positions are so-called hybrid positions, which include a wide range of functions. Thus, technological developments are also moving toward multifunction workstations. Recent telecommunication services, known worldwide, will increasingly facilitate possible attempts to integrate language, data and text communication.

In order to rigourously carry out these leading ideas on integration, and to be able to implement them efficiently, a systems concept is needed that will ensure the compatibility of present and future subsystems, bearing in mind equipment and interface variety. In this phase we already possess a

considerable managerial task in the competent and continual monitoring of the applications engineering for these systems. Among the chief prerequisites for the successful use of office systems are the following:

--coordination of strategic requirements for the varied structural units of the different managerial levels on the basis of scientific and technical designs;

--inclusion of the user in the development and introduction of the systems concept;

--the qualifications of the user in light of office systems use.

Coordination of the afore-mentioned viewpoints supports the requisite long-term nature of the integration concept considerably. In preparing and realizing such concepts, the prevailing organizational conditions, in particular, as well as the qualifications of key personnel must be considered. The most crucial question for the decision-maker is to what extent the directorships for organization and data processing in the combines and enterprises, considering their design organization and the qualifications of key personnel, are capable of coping with tasks of this type and proportion. Necessary qualification procedures must be introduced promptly. Certainly, we must not overlook the fact that the integration of data processing, telecommunications and office systems, whose goal is the creation of an office systems, requires longer-term development. Office work can be regarded as a specific form of human work, whose object information is. Office work, in the broadest sense of the term, contributes to the decision-making process, too. In general, we can differenciate between routine office work and creative office work. Routine office work is performed by the data carriers without the processor considering information content, while creative office work deals with the interpretation of information content to facilitate problem recognition, decision support and decision-making. Office communications is an important prerequisite for the attainment of such efficiency in office work. In practice, a range of office automation systems is quite common; these include, inter alia, the telephone, telex and facsimilie, where each of these possible communication services possesses its own data terminal. With the increased use of different services, the juxtaposition of varied terminals is no longer efficient, thus lending meaning to the so-called multifunction terminal. In this connection, fixed data communications standards, as well as given definitions, rules and structures, must be complied with to ensure the development of future office systems. The clearer it is that the directorships for organization and data processing have assigned the task of integration of data processing, telecommunications and office systems to the combine and enterprise managements, the more feasible this becomes. This procedure offers the protection of a comprehensive office systems design, and finally of an information infrastructure adequate to the combine.

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GERMAN DEMOCRATIC REPUBLIC

BRIEFS

NEW PCB DRAFTING MACHINE--Machines equipped with a laser and controlled by computer are being manufactured this year by the Rostock Development and Production Plant for Microelectronic Rationalization Equipment for drawing images of printed circuits. By using a laser beam, the newly developed automated machines produce circuit images, input by paper tape, on special photographic material. The plate thereby produced is needed to etch by photochemical means the desired printed conductor diagram on copper-coated boards which are later to hold integrated circuits. The PCB drafting machines are intended for scientific institutions and the rationalization means construction of small and medium-sized enterprises. A patent application has been filed for the technology which was developed at the Warnemuende/Wustrow Engineering College for Navigation. ADN-BWT/1658/850223. [Text] [East Berlin FEINGERAETETECHNIK in German Vol 34 No 8, 1985 p 339] 8545

SPECIAL GLASS, CERAMICS USE--For development and construction of unique electronic or ion-physical apparatus, it is often time consuming and uneconomical to have special insulators made from conventional ceramics which are suitable for use in a high or ultrahigh vacuum (e.g. sintered corundum or KER 710). In this case, mechanically workable ceramics have much to offer. Ilmavit (registered) 40 and VKB-MgO were developed as such in the GDR and successfully tested in use in the electrical/electronics, precision apparatus, machine building, chemical, transportation and the consumer goods industries (fig. 1 [not reproduced]). In the process, nonferrous metals, fine steel, steel castings, plastics or insulating ceramics are replaced by these materials. In using these materials which can be worked like metals, the glass-like material features of these vitreous ceramics must however be considered. Since their mechanical, thermal, electrical and, in part, chemical properties have been described in detail in the literature [1], only some selected properties, which are important for use in building scientific apparatus, need be drawn up here in the form of an overview (tables 1 and 2 [not reproduced]). Since relatively little is known about the vacuum technological properties of these materials, the following described studies were made. For use in vacuum engineering, the vapor tension and the specific gas liberation rate of the material are important. Since based on chemical composition, one may expect saturation vapor tension to be low at room temperature, only gas liberation should hereinafter be studied. [Excerpt] [East Berlin FEINGERAETETECHNIK in German Vol 34 No 8, 1985 p 339] 8545

NEW ESER VIRTUAL OPERATING SYSTEM--AIDOS software solutions for several years have been the basis for operating automated information query systems in various branches of the economy here and abroad. Based on the experience gained by more than 200 users of the AIDOS DOS ES and the AIDOS OS/ES, and considering the raised requirements of modern devices and operating system, a new AIDOS, the AIDOS/VS, was developed at the Dresden VEB Robotron Project. Just as its predecessors, the AIDOS/VS is a general-purpose information retrieval system, which is used to store, update, retrieve, edit and output variable-length data of various types. This information can be stored in several data bases (pools). Information is retrieved by means of efficient query methods in the interactive or batch modes. AIDOS/VS is an efficient retrieval system which supports a broad selection of information retrieval languages and creation and processing of multilingual and polyhierarchical thesauri and hierarchical classification. It ensures the protection of information and the integrity of the data bank. The new product is an interactive-oriented information retrieval system for ESER 2 [Unified System Series 2] computers with virtual storage which meets the increasing demands for information operations of the eighties. Menus are used to make it easy for the user to communicate with AIDOS/VS. The user is informed through screen displays of functional selections and required inputs. User-specific data descriptions allow adaptation to a particular applications area. AIDOS/VS uses microcomputers for data entry and transfer. [Excerpt] [East Berlin NEUE TECHNIK IM BUERO in German Vol 29 No 4, 1985 p 126] 8545

PARALLEL ACCESS TO ESER DATABASES--System software for on-line processing should allow many users access to a common data base in parallel through remote or local data stations. Implementing this task requires comprehensive system programs to control, coordinate and monitor all resources needed for the overall solution; it cannot be solved by sole use of the batch-oriented OS/ES operating system. Moreover, information availability to the user as fast as possible must be ensured. Developing this system software cannot be left to the data teleprocessing user because of its complexity and required flexibility. The VEB Robotron Project in Dresden is providing comprehensive system utilities in the DAKS data communication system and thereby eliminating the need for user software development in the area of system-specific control, management and resource coordination. By delivery of a standard set of services and software facilities, applications programming of on-line tasks is simplified. Efficiency is thereby raised considerably during the development of applications programs and use of the on-line system. Currently, the DAKS system is used primarily as an on-line system for the AIDOS/VS information retrieval system. The DAKS system is suitable for all the usual on-line applications in the most varied areas of the economy. It can be used where, e.g., retrievals have to be made on an AIDOS/VS data bank and data stored in the data bank, data sets of OS ES data files have to be stored, retrieved and updated, jobs acquired and processed, data acquired, and messages transferred among terminal users and between terminal user and applications programs. The DAKS system implements interactive operation to produce decisive advantages to the user, such as immediate availability of information; decision capability at the workplace; decentralized data acquisition; rapid, secure and efficient work process organization; and simplification of information flow. Version

1.0 of the DAKS system has been completed. It is in use in applications in various industrial branches. An expanded version is currently being developed. Compared to 1.0, the major performance enhancements in the expanded version are: support of the Robotron A 5120 A 5130 office computer, the Robotron K 1630 microcomputer and the Robotron A 7100 work station computer as intelligent terminals in the DAKS system and creation thereby of the prerequisites for the construction of applications subsystems on these intelligent terminals. The user thereby has the capability of organizing data communication through various computer hierarchical levels. Software for the intelligent terminals is supplied for this by Robotron as standard software in addition to the DAKS 2.0. NTB 3352 [Excerpt] [East Berlin NEUE TECHNIK IM BUERO in German Vol 29 No 4, 1985 pp 113, 115] 8545

UNIVERSITY-COMBINE RESEARCH COOPERATION--1. Introduction. The Information Processing Department of Dresden Technical University was set up in 1969. Since then, there has been close and broad cooperation between this department and enterprises in the VEB Robotron Combine, particularly with the present VEB Robotron Project in Dresden. Leading Robotron scientists are active as instructors in the department. Numerous graduates of the study of information processing as well as young scientists educated in the department now work at Robotron, some in responsible positions. Considering the high development dynamics of informatics and computer engineering, cooperation in the area of further education is gaining in importance. A tradition of many years is the collaboration of leading scientists in the Robotron Combine and the Information Processing Department of Dresden Technical University in scientific groups of the respective partner institutions for consultation and coordination of research concepts, and plan tasks and pledge materials for product developments. Robotron's foreign trade activities are supported by the department. With respect to the transfer of results of basic and applied research, the Dresden VEB Robotron Project is among the most important practical partners of the Information Processing Department. With the conversion of such research results into software products for Robotron computer systems, the department achieves a particularly high effectiveness of its research work. Therefore, in numerous cases, the department collectives themselves, in which in addition to instructors and staff, not least numerous students have also actively participated, have undertaken the development of software products on the basis of research results achieved. In November 1984, with the DABA 1600 relational data bank operating system, another result of this cooperation was produced and delivered to the first user. This software product was developed as a result of the cooperation between the collectives of the Dresden VEB Robotron Project and the Information Processing Department of Dresden Technical University. [Excerpts] [East Berlin NEUE TECHNIK IM BUERO in German Vol 29 No 4, 1985 p 98] 8545

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HUNGARY

SUCCESS STORY OF HIGH TECH OPTICAL WORKS CONTINUES

Budapest MUSZAKI ELET in Hungarian No 15, 20 Jul 85 p 10

[Article by Zsuzsa Ban: "New Product Structure; Shifting Gears--Without Slipping"]

[Text] The Hungarian Optical Works (MOM) is one of those few of the largest factories which thought out well how it could and must shift gears in time--without "slipping."

The factory on Csorsz Street is in a privileged situation, the Buda hills protect it from the smog. But even this air is not pure enough for most of the computer technology products of the MOM; in the 65th department, manufacturing fixed disk memories, a thick glass wall separates the equipment and the people working there from the outside world. Not even sound penetrates the protective shield. The glass hall is divided into three parts--one can enter the semi-clean room and the clean room only through a dressing-room lock, in work slippers, antistatic gown and snow white cap. In the special assembly chambers, the so-called laminar boxes, the supersensitive products are protected by surgical gloves from the acid touch of the hands.

Technological Discipline

"A single quarter micron speck of dust is all that is 'allowed' in a liter of air here," explained Attila Hennel, chief engineer for technical control. "This cleanliness requirement is the basis of technological discipline for us."

The fixed head magnetic disk memories are made carefully for these have been the success products of the factory since the end of the 1970's. The manufacturing license was taken over in 1971 from the French Sagem, which since then has maintained constant, close technical cooperation with the Hungarian enterprise. Naturally as a purchaser too, building the information units into their own highly valuable computers.

"This commission represents reference value for us," mused Attila Hennel. "It proves that we are capable of delivering basic parts to memory manufacturers which are at a high technical level and extraordinarily reliable."

The technical experts of the MOM developed the license further after adopting it. They are already capable of manufacturing 5 megabyte disks. This covers the needs of the Hungarian computer factories and they also fill significant Soviet orders. The magnetic disk store already counts as an introduced product. They are developing manufacture of floppy disk stores in normal and mini versions. Their newest product is a Winchester type store the first small series of which will be prepared by the end of this year.

Manufacturing the important and valuable memories which write and read information changed the course of the MOM in the strict sense of the word beginning in the 1980's. Jozsef Sebesfi, chief of the economics main department, explained this while we walked toward the old-fashioned office building in the courtyard of the site.

"For example, this plant of ours," he pointed toward a metallic-glowing 5-story building, "is the last stage of a large scale investment which we have been carrying out since the 1970's."

With the one billion investment the MOM created a broad product assortment which assumably will be a suitable base even in times to come for smooth product development and factory development. And let us immediately add, the firm succeeded in avoiding the pitfalls which frequently accompany investment and have caused serious problems for more than one industrial enterprise. Its development has been steep and even. Since 1980 it has increased its production value by an average of more then 10 percent per year. The magnitude of the development in 5 years has been about 60 percent. The material free production value index indicates a good bit higher "record" of 180 percent. Nor has profitability decreased; it is high above the industrial average and exceeds 20 percent.

More Dynamically

We have often heard that the changes to the regulator system affect unfavorably only those enterprises the development of which is not even enough. How do they feel this at the MOM? For the dynamics here are a good bit greater than the average nor is there a lack of export interest--70 percent of their products are sold on foreign markets, more than 15 percent within this on the markets of the most developed countries and of developing countries.

"We don't like to complain. The 10 percent production increase has been accompanied by a profit increase of about 20-22 percent each year. Now, with the change in economic guidance, this ratio has narrowed a bit but we are confident that the rate of growth of profit will not lag behind the rate of growth of production in the future either. Everything depends on how successfully we can operate the investments which have been realized and on how profitable the manufacture of the new products being introduced now is, taking the expected market competition into consideration too. The essential condition for successful management is that we must turn greater sums than earlier to wage development proportional with performance. If we want to keep our well trained expert staff we must increase wages and earnings by at least 8-10 percent. And, as is well known, this puts a great material burden on the enterprise."

The MOM is one of those enterprises--their number is decreasing--which must care for the secure development and survivability of several provincial factory sites. Did they not think that their situation would be easier if one or another provincial factory became independent or became a subsidiary enterprise, as is the fashion these days? Then, perhaps, it would be simpler to get around the problems of wage development?

"Where the provincial factories fit so closely into the vertical structure of the enterprise, as with us, this method is hardly to the point. In any case, we never sought easier solutions, when necessary we undertook the burdens of provincial industrialization. Today also what is useful guides our decisions. In the early and middle 1970's it caused temporary difficulties at the MOM that we did not succeed in starting up production in the manufacturing bases we had created in as short a time as we had planned."

With a Unique Profile

"Our factory units in Dunaujvaros, Mateszalka, Zalaegerszeg and Komlo have now grown up to their tasks, each of them has its own unique profile, but this cannot be isolated from the central program of the factory. Centralization continues to be strong for us, product and manufacture development take place in Budapest. The management and commercial center is here also. This does not mean that we do not want to develop a unique, new incentive system for the factory units--simply in the interest of more efficient management. But since the market structure changes quickly there is a constant need for new products, for continual further development within the product structure. This can be followed only with strong central development. It is not certain that it is good if every little factory is subject to the vagaries of the market. The market problems which unavoidably arise from time to time, the technical and material supply problems, can be weathered better in a large factory combination."

By the beginning of the 1980's the MOM had essentially completely renewed its product structure. Computer technology received ever greater significance in its activity--representing almost half of its production today--and the share of geodetic and laboratory instruments and precision optical products increased strongly also. They still had energy for the manufacture of products which replace import and produce a multiplicity of novel items in the Budapest and provincial factories. The use of laser technology in acupuncture, in gynecology and in cosmetics could be a profitable branch. In Zalaegerszeg they are specializing in fiber optics, geodetic products and mini-floppies. Dunaujvaros is realizing increasing floppy manufacture while continuing manufacture of scales and alarm clocks. The Mateszalka unit, famous for its eyeglass lenses, also manufactures flow meters and vehicle parts. At Komlo--in cooperation with Westinghouse--they are producing brake parts. The successful management is proven by the fact that today the MOM exports to capitalist countries almost twice as much as it obtains from import--for all production.

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HUNGARY

PRESENT, FUTURE OF MICROELECTRONICS AT HOME, ABROAD

Budapest SZAMITASTECHNIKA in Hungarian Aug-Sep 1985 p 3

[Abbreviated version of talk by Mihaly Sandory, government commissioner and director general of the MEV (Microelectronics Enterprise), at the MATE (Scientific Association of Measurement Technology and Automation), 2 April 1985: "The Domestic and International Status of Microelectronics and Expected Prospects for Its Further Development"]

[Text] The question is timely from two viewpoints. One is that we are at the end of a 4 year investment, an account of the achievements can slowly be given, and preparations for the next 5-year plan are under way, and various alternatives are being discussed. We should find our place first by precisely surveying the international situation, even if it is unfriendly for us. One datum is interesting in any case--more than half of the working population of the developed capitalist world is in touch with electronics, about one third of them have a direct contact with it. In our country a far smaller proportion of the working strata participate in the production of this branch of industry, and few use or apply the possibilities offered by electronics. It is trite to talk about our telephone situation, but nevertheless we can establish that the relatively low degree of the spread of electronics is today one of the chief obstacles (although not the only obstacle) to a more dynamic development of industry. This holds true for the information systems, planning, manufacture, supervision and process control alike. So while this breakthrough has taken place in many places we are only now starting in this direction. Thus far we have lacked both the material assets in sufficient quantity and the preparation needed for accepting the technology. This is one possible and essential approach. A comparison of our own situation and the world level in this respect is most depressing for us.

Division of Labor

From a number of viewpoints the division of labor within the electronics industry is also essential, and again we should draw the conclusions. One can observe two great processes. One is that the technological demarcation which used to exist among the various branches of the electronics industry is becoming blurred. We still distinguish the communication engineering and computer technology industries--perhaps even at the level of higher education--but if a person goes into a factory he cannot tell if it is a

computer technology or a communication engineering factory. He will see the same equipment, devices and processes in both, and the same is true of the instrument industry as well; the technological foundations are increasingly common ones. The other trend is that with the development of technologies for parts manufacture more and more can be crowded into a single part. The consequences also go in two directions--on the one hand, at a given complexity level the devices consist of fewer and fewer parts; on the other hand, a person can build more and more functions into a given device. This has very far-reaching consequences in regard to the division of labor within the electronics industry.

If we build very many functions into each device then the series sizes with which we manufacture these devices will necessarily be smaller.

Thus to attain acceptable cost-effectiveness the production processes must be automated to a higher degree. Older people may still remember that we once conducted great debates about what we should call a part. The outcome of the debates was that a unit produced in an automated production process could be called a part. It follows from this that an ever greater proportion of devices will be parts. There will be more and more devices which can be realized with a single part, and the parts ratio within a device will grow. Formerly in order to assemble a 2+1 super device one had to have as many parts as are needed today for a desk computer. The division of labor between parts manufacturers and device manufacturers had to change as a direct consequence. At the present technological level one can no longer imagine that a parts manufacturer would prepare specifications for a certain parts series on the basis of some sort of market survey specifying, let us say, 300 types of circuits, and the device manufacturer would try to produce devices from these types. The device manufacturer must participate in the various processes of parts manufacture from specification to quality control.

This phenomenon can be observed well in the electronics industry of the world. A number of giant firms have set up essentially to manufacture their own parts or are joining with their capital in a plant to manufacture parts, which produces parts according to their need.

Hungarian Peculiarities and Problems

Let us look at our own situation from this viewpoint. Now we can be even more depressed than in the first comparison, because there we might improve by spending a little money. But the capital movement and manpower movement that would be necessary for industry to make changes in the division of labor are completely unimaginable here. Neither the mobility of people nor the system of allocating assets make this possible. It is a strange thing that under capitalist market conditions (the private capitalist decides about his assets there) there is mobility without further ado while at a level of social ownership where society can decide about the allocation of assets there are limits which cannot be changed.

The third factor is changing the cost structure of electronic industry products. Electronics is a branch which fits well the load carrying capacity of the economy. It is not demanding of energy or primary materials (it does

not need primary materials measured in tons or rail cars); it requires primarily intellectual work. The demand of the electronics industry for this intellectual work is increasing. According to 1984 statistics the intellectual expenditure comes to about 60 percent of all production value or of all expenditures (including here the design of printed circuits and test programs, etc.). So the assertion that this branch of industry should be attractive under our circumstances is increasingly true. Of course, there are one or two conditions for being able to exploit this. It is well known that the material and moral recognition of the technical intelligentsia here is not satisfactory; we must struggle against this. Still, this peculiarity of ours makes it possible for us to make products containing a large intellectual component relatively more economically, if we can get the qualified intellectual worker to work with the same efficiency as, for example, in the West.

The problem is a double one. On the one hand it involves how much and for what the intellectual work is qualified. This develops in university education and in industrial practice. Up to the middle of the 1970's the technical university instruction here represented the European front rank, and this was noted everywhere in the world. We began to lose this advantage due to the relatively modest ratio of technological tools for instruction. An electrical engineer graduating today may still be able to compete with his colleague who graduated "over there," but he has lost his advantage, and the trend is not good. Significant changes would be needed and one must think of different sorts of contacts between industry and higher education (not a serving-exploiting contact). The other thing is that if an engineer is to work effectively in, let us say, design in the area of electronics he would have to put on the table about 200,000 dollars worth of equipment. This is how much we find on the table of an average designing engineer in economically developed countries. If one of us, for example, were to try to calculate how many tools we have to aid design I am certain that the sum would be under 200,000--in forints. Inspired talent (if it exists) may help even relying on a relatively weaker supply of tools, but we cannot bridge over such multi-generational differences with inspired talent alone. So first of all we must ensure the efficiency of intellectual work. I readily admit that the automated secretary, office automation, is more spectacular and can free a lot of personnel, but if we are to improve the efficiency of the work of the intellectual worker, whose qualifications are many times greater, we must provide incomparably more material assets.

A Critical 2-3 Years

The Electronics Central Development Program began in 1981 with a total expenditure of 4 billion forints. This is about as much as we could use sensibly in one round. We would not have been capable of a greater technical step forward.

An infrastructure (production conditions) was created at the Microelectronics Enterprise which produces the best specifications which can be obtained in the world today. What is missing is reliability and a certain degree of automation. But the peak accomplishments, for example the 256 K bit memories,

are not manufactured under essentially better conditions anyplace in the world.

The technology and the machine line come from a Soviet source. The technology is based on so-called wet chemistry; this ensures a certain level. (For several years already the front rank has been using dry chemistry--ion etching and other operations.) Our plant consists of custom machines and diligent women move the material between machines. They are a first generation work force in this area. Earlier they got used to an environment which "demanded" a certain simplicity of them. Changing this is not a question of deciding to do so; it is a task requiring effort and a long time.

Modern plants are almost completely automated in the world, and even the second rank is largely automated. This is done to reduce or eliminate human "errors" and to prevent contamination in the peak technologies which determine cost-effectiveness. It is the human being who brings contamination into the work place. Automation is needed partly for the reliability of the processes and partly as a matter of principle, to achieve a certain degree of safety. As a whole, however, we can be satisfied. On the basis of 1984 statistics, about 60 percent of all integrated circuit production was done under such or worse conditions; and in 1983 this figure was still 80 percent. A critical 2-3 years will follow now. If we rest on our laurels then each year we will drop back a year instead of catching up. If we can manage the same expenditure (similar to the present one) in the next 5-year plan then we may reduce our backwardness further. Another factor is that we bought a technology which was 12 years old. The chief reason for the choice was that this is what we could get! In the beginning we had more ambitious ideas, especially in 1980. Finally the government program was left with this version, for a number of reasons--a license for it could be purchased from the Soviet Union, there were already embargo difficulties. This 12-year-old technology manufactures parts which the user in Hungary does not use today. (Let us add that the ES 1045, one of the most modern computers of the socialist camp, does use such memory elements.) Fortunately we also succeeded in buying a few partial technologies from various relationships. The 12-year disadvantage can be reduced with these so that today we are working with almost the same conditions as Czechoslovakia and the GDR, among the socialist countries. The substantially greater expenditures of the GDR must be taken into consideration here. A concrete example in the Czechoslovak relationship is the Czech MOS factory which initiated the founding of a joint enterprise, in the interest of obtaining a Hungarian MOS line. So we are largely in line with the surrounding countries. Our Yugoslav cooperation is free of trouble.

BOAK's [equipment oriented circuits] In the Foreground

The domestic computer technology industry is justly saying that we should deliver 64 K bit memory chips to it and not the 16 K bit chips. The heavy communication engineering industry is also right when, for example, it demands filters with a more developed technology. The program was not able to meet such demands in the first stage, nor was this its goal. We were able to begin manufacture of the 16 K bit memories in 1985, and we may manufacture the 64 K bit memories in 1987-1988. But the MEV [Microelectronics Enterprise] will continue to regard these catalog circuits as only a sideline. There has to be

a product which will test the technological line continually, daily, hourly. This is what is needed. About 200 sequential technological operations have to be performed with very narrow tolerances if the part is to be a good one in the end. Now let someone try to calculate, if every such operation is performed with 99.999 percent reliability then what is the probability that a single reliable part will come out after the 200 operations? It is below the threshold of pickup! We need parts with greater reliability than this! This also influenced the fact that we chose a policy according to which manufacture concentrates on the so-called equipment oriented circuits produced in relatively small series and embodying a larger intellectual work component. The question is whether this coincides with the interests of Hungarian users. At a distance of several years it is certain that the useof equipment-oriented devices has spread more slowly than expected for several reasons. One is that in 1983-1984 the Hungarian parts industry frittered away the small credit it had.It did not stick to its promises and there were systematic problems with the reliability of the parts delivered. If someone decides to use equipment-oriented circuits there is a risk; if there is some production problem at the manufacturing enterprise then production stops for the user too, if he does not have a second acquisition source and so is at the mercy of the shipper.

The other factor is that one can convert only in the developmental phase. To redesign every device being manufactured for a different parts base is impossible for us at the present level of automated design.

Learning Curve and Modernization

Another essential factor is that individual interest is a counteracting force. There is this aspect to the division of labor, that the patent of the engineer of the device manufacturer is in the device. If the parts manufacturer "charms" an equipment oriented circuit into the device then it is his patent from then on. In addition the application began with the relatively unexpected overtone that it was not primarily the electronics industry but rather the non-electronic part of the machine industry and the heavy current industry which wanted the modern circuits. So we are able to produce these with relatively modern parts. The computer technology and communications engineering industries fall outside our present possibilities. In essence the electronics industry has not been able to invest for the past 4 years, because the investment restrictions weighed heavily on this industry, which in any case uses quickly amortizing equipment and tools. For this reason the receiving technologies do not have those tools which would ensure use of these parts. The situation has developed that there is a much greater demand for the parts of the MEV in the Czechoslovak electronics industry than in domestic industry. From a certain viewpoint this is good for the MEV, because the price level of the socialist countries is higher than the price level authorized in our country. But from another viewpoint it is bad for the economy, because it was not the goal to create simply electronic parts manufacture which was economical in itself but rather that we should make progress in modernizing the production and product structure of the domestic electronics industry. The situation will improve somewhat this year. On the bipolar line we will produce parts largely for domestic needs (for the needs of the consumer market and the instrument industry). In the computer technology industry and communication

engineering industry we can count on a considerable improvement in supply at the end of the 1980's and the beginning of the 1990's. In the next developmental phase, the plans for which largely exist, this will require an investment of about 6 billion forints. With this we hope to create a base with which we will be able to go up to 256 K bits with ROM's or mask programmed memories, for example. With the development of designing tools which can be imagined this complexity will remain the economic optimum for a long time. I do not consider the development to be a question of money alone. Let me emphasize again that we cannot fully exploit the possibilities of our present technologies. We are climbing up a learning curve and we estimate that it will be about 2-3 years before the infrastructure, the machine park and the people will constitute a system of uniform strength which will be efficient even by the strictest economic standard.

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GRAPHICS DEVICES AT INTERNATIONAL FAIR

Budapest SZAMITASTECHNIKA in Hungarian Aug-Sep 1985 p 5

[Unsigned article in BNV (Budapest International Fair) section: "Graphics Devices"]

[Text] The GD85 Tekemu and the GD85 Texpro equipment could be seen at several stands at the fair. The Tekemu with a new exterior appeared at the stand of the HTSZ [Communication Engineering Cooperative]. At the pavilion of the OMFB [National Technical Development Committee] they demonstrated the AULA 3, the so-called ULA circuit design program system, in operation on a Tekemu display connected to the TPA-11/440 system of the KFKI [Central Physics Research Institute].

VILATI [Electric Automation Institute] appeared with an intelligent graphics terminal. The IGT equipment is compatible from above with the VDT 52101 (DEC VT52) terminal of Videoton; among its characteristics one should mention the possibility of character generation which can be defined by the user, the user menu system and the 32 K bytes of user memory. The number of pixels which can be displayed is 640 x (288 + 12).

The VBKM [Electrical Equipment and Appliance Works] also appeared with a new, color family of graphics displays. They developed the raster system SZGD device on the basis of the MMT [possibly, Instrument and Measurement Technology Faculty of the Budapest Technical University] system. The first two members of the family are the SZGDP-1 color graphics display and the SZGDT-1 color graphics picture screen terminal (the latter also has an alphanumeric keyboard). Display takes place with a color TV set or a monitor. The equipment also has a command set compatible with the Tektronix 4061. In the terminal mode there is a possibility for conversational image editing and transmission of the image content to a computer in the form of a data block (for example, a complete picture).

The guide price of the SZGDP-1 is a little under 300,000 forints. The first five will be made in 1985.

Among the graphics display devices representing the peak technology this year we might mention the TEK 4105 color graphics terminal of the American Textronix firm which has a 33 centimeter screen, a choice of 64 colors eight

of which can be displayed simultaneously, 480 x 360 pixels and the so-called window management technique built in. The price of the basic machine is 5,400 dollars. It can be connected to a programmable TEK 4170 local graphics processor, which was also shown. The high performance graphics work station of the Austrian Sysgraph firm contains a 48 centimeter, color picture screen, medium resolution monitor, keyboard and graphics data input tablet.

In the area of graphics output devices the desk size, two pen, intelligent digital drum plotter of the Industrial Instruments Factory in Iklad attracted the attention of domestic experts. The device successfully combines the text display capability of alphanumeric printers with the graphics services of digital plotters. The EMG [Electronic Measuring Instruments Factory] displayed a flat plotter. The drawing surface of the 79815 model makes possible two color A/3 drawings in the pen switching mode; 13 parameters can be set and 14 drawing instructions can be given. The new NE-2020 device of Videoton has a number of exchangeable interfaces. The first 50 unit series of the OH-860 plotters of the Radelkis Cooperative will appear this year. In the attached table we compare a few parameters of domestic plotters.

More Important Characteristics of Domestic Plotters

	Intelligent digital drum plotter	NE-2000*	NE-2020	79815	OH-860	Coroll-press-4*
Manufacturer	IMI(1)	Videoton	Videoton	EMG(2)	Radelkis(3)	MAELGI(4)
Type	drum	flat	flat	flat	flat	drum
Resolution	0.1 mm	0.1 mm	0.5 mm	0.1 mm	0.1 mm	0.1 mm
Paper size (mm)	390 (roll)	297x420	297x420	297x420	280x390	400x700 or 400 (roll)
Max drawing speed (cm/s)	5	15	15	30	25	5000 point/s/head
Number of pens	2	1	1	2	1	4
Interface	Serial CCITT V.24 (RS232C)	BSI; EMG666	BSI; RS232C; IEC-625; NK-666	IEC-625 or parallel Centronics	Serial CCITT V.24 (RS232C)	ES-1010; ES-1011; CFS1; HT 680X
Size (mm)	710x290 x380	500x150 x450	510x155 x510	525x140 x483	525x270 x535	850x400 x350
Price or guide price (1,000 forints)	190	136.8	174.3	170	202	1,600(5)

* Did not appear at this year's Budapest International Fair.
1. Industrial Instruments Factory, Iklad.
2. Electronic Measuring Instruments Factory.
3. Radelkis Electrochemical Instrument Manufacturing Industrial Cooperative.
4. Hungarian State Lorand Eotvos Geophysical Institute.
5. With control unit.

The DMP 40 drum type desk plotter shown by the English firm Quest can make drawings on A/3 or A/4 size paper; its resolution is 0.1 mm and its speed is 7 cm/s. It takes very little space (53.8 x 20.3 x 15.2 cm) and weighs only 4.5 kilograms.

Precision, large size X-Y plotters are missing from the domestic offering. The West German firm Aristo introduced such a device. The Aristomat Reihe 200 is suitable for preparing intelligent drawings (A/1, A/0 and 2A/0); it has a speed of 50 cm/s and a resolution of 0.0025 mm (!).

The American firm Hewlett-Packard appeared for the first time this year with its small size, desk type, precision plotters. Both the HP 7470A (A/4 size drawings) and the HP 7475A (max. A/3) devices have a resolution of 0.025 mm and a drawing speed of 38.1 cm/s; two or six color pen sets can be used simultaneously.

A new large size drawing table peripheral, the Digigraf 1208A, aroused special interest at the display of Czechoslovak computer technology devices (see the June 1985 issue of SZAMITASTECHNIKA, page 5). At the exhibit of domestic CAD applications we could see plotters or digitizers almost exclusively of capitalist origin built into systems.

We could also find plotters and digitizers in the offerings of Robotron. The K-6418 plotter works on A/3 paper format, has a precision of 0.1 mm and a maximum speed of 24 cm/s. The K-6401 digitizer can be used up to the A/2 format, has a resolution of 0.01 mm and uses a V 24/RS-232-C interface. The K-6402 high resolution digitizer can be used up to the A/0 format and also has a resolution of 0.01 mm.

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NEW MICROPERIPHERALS AT BUDAPEST INTERNATIONAL FAIR

Budapest SZAMITASTECHNIKA in Hungarian Aug-Sep 1985 p 7

[Text] The real peripheral sensation of the BNV [Budapest International Fair] was a domestic product, a product of the Hungarian Optical Works, the MW-1000, the first Winchester type microstorage developed in a socialist country. The store, indispensable for efficient use of larger capacity microcomputers, has a diameter of 5.25 inches and an unformatted storage capacity of 10 M bytes. It's only blemish is that series manufacture is expected to start only next year. Following the developmental model shown one can expect a prototype and manufacture of a test series of a few units this year.

The BNV did not bring anything really new in the area of floppy disk stores; there was only an expansion of the peripheral assortment for users of a few machine types. Thus, using the MF 1800/900 floppy disk store of the MOM [Hungarian Optical Works], they presented an FDU 1109 external store intended for the Primo microcomputer and a double density store for the EMG 777 also based on the MOM store. One must mention here that the SZKI [Computer Technology Coordination Institute] attached a Meramat wide magnetic tape store to the Proper-8. This also provides a large computer link for the microcomputer.

The Datacoop Small Cooperative exhibited for the first time its DCD-PRT-42 printer which, with a price of 24,000 forints, is at present the cheapest matrix printer made in the socialist countries. Another novelty from Datacoop is that they expanded the DCD-PRT-80 printer, introduced at the BNV last year, with graphic possibilities, and at the same time reduced its price to 49,800 forints. The Karman matrix printer of the Rosemary Agricultural Producer Cooperative also appeared at the stand of Elektromodul.

Just as we could observe a saturation of the domestic market in the area of matrix printers in 1984 so in 1985 a similar situation will probably exist in the smaller size and precision category of computer controlled plotters.

The DCD-OT-327 keyboard, a product of the Datacoop Small Cooperative, qualifies as a new item in several respects. A Hungarian patent protects its optical operating principle; it works with infrared touch and with a selling price of 13,900 forints it costs half as much as domestic professional keyboards in general. We might mention as a matter of interest that at the pavilion of the "Creative Youth" we could try out a Primo computer which had a built-in DCD-OT-327 keyboard and thus bore the new designation Primodata.

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MXT: NEW MICROCOMPUTER OF MUSZERTECHNIKA

Budapest SZAMITASTECHNIKA in Hungarian Aug-Sep 1985 p 20

[Article by Attila Kovacs: "MXT, the New Microcomputer of Muszertechnika (Instrument Technology)"]

[Text] Muszertechnika, which has gradually developed from a GMK [economic work association] into a small cooperative, appeared at the spring BNV [Budapest International Fair] this year with a new microcomputer which can be expanded into a multiple work station system. The 16 bit MXT is completely compatible with the IBM PC-XT professional personal computer. The central unit of the machine is built on an Intel 8088 microprocessor; an Intel 8087 arithmetic auxiliary processor can be used as an expansion option which, in the case of a multiple work station system, makes possible an increase in operating speed and significantly relieves the burden on the central unit.

In its basic configuration the MXT has 256 K bytes of operational memory but it can be expanded to 640 K bytes in 64 K byte steps. The system can be prepared in several versions up to a maximum of a five work station system. With the usual serial and parallel peripheral interfaces, additional optional hardware expansions are offered for both single and multiple work station systems; among other things, one can use a continual operation magnetic tape unit or have call reception and automatic call handling on connected or leased telex lines. Connection to a Postal X21 network, the handling of the call mechanism and the handling of synchronous lines (for example, BSC) for large computer links take place according to the IBM 2780 and IBM 3276 algorithms. There is also an instrument interface and VT-52 terminal emulation for TPA and DEC computers.

The MXT is shipped equipped with 10 or 27 M byte Winchester disk stores in both the single and multiple work station versions. In a multiple work station system one can have, in addition to the basic machine, an additional four units, the well known domestic asynchronous serial (VDT, VDN, ADP) terminals or the terminals of Muszertechnika.

Compatibility means, among other things, that in addition to communication and peripheral interfaces the MXT and the IBM PC-XT are compatible with one another at the level of expansion card connectors as well. The MXT can use the IBM format, 360 K byte, 5 1/4 inch floppy disks. The layout of the keyboard is

exactly the same on both machines, with the exception of the placement of the function keys. One can also find two LED indicators on the keyboard of the MXT. The placement of the Hungarian accent keys corresponds to the layout of the standard typewriter keyboard. They provide MS-DOS, compatible with PC-DOS, with the machine, but it is also possible to use other developed operating systems (CP/M-86, Concurrent CP/86, QNX, etc.). Supplementary software loaded into the operating system solves conversion between the original character set, interpreted as unused key combinations, and the Hungarian accented character set. In an advantageous manner this function persists when running applications programs. In addition to the well known and popular interpreter programs there are available to the user applications generators, framework systems and finished applications program packages from both Muszertechnika and other domestic firms (the SZKI [Computer Technology Coordination Institute], the EGSZI [Institute of Construction Management and Organization], the MUSZI [Office for the Organization of Agricultural Business Management], the SZAMALK [Computer Technology Applications Enterprise], etc.).

The MXT offers users significant advantages. On the one hand it can run the entire IBM PC applications software assortment without change. On the other hand one can solve with the multiple work station MXT, quickly and in real time, many tasks which require data input and access from many points with central processing, and the increase in access can be exploited significantly. Finally, in the case of a multiple work station system, the specific machine cost per work station decreases and in the case of using suitable finished program systems for enterprise purposes the preliminary organization is simplified.

In regard to external appearance also the MXT satisfies the most modern requirements. The display in a plastic housing can be turned and tilted, the tilt angle of the keyboard can be adjusted, and the color combinations on the keyboard are similar to those used on the IBM PC.

The import parts ratio in the system is higher than in other domestic microcomputers. The MXT can be ordered with two types of Winchester disk units, with a monochrome or color display and with one to four work stations. The price, accordingly, is 790,000 forints. The cost of the 256 K byte RAM expansion is 110,000 forints. The cost per work station is 320,000 to 450,000 forints--depending on the version--in the five work station system. The plans of the small cooperative for this year call for sale of 100 of the MXT systems.

Among the possible applications areas we might mention business mechanization, office automation, smaller enterprise information systems, measurement data collection, measurement data processing and laboratory applications.

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ROLE OF HUNGARIAN TOKAMAK EXPLAINED

Budapest MAGYAR HIRLAP in Hungarian 12 Sep 85 p 8

[Interview by Gyorgy Foris]

[Excerpt] [Question] In real terms, what role has the KFKI [Central Physics Research Institute] taken in research in connection with fusion reactions?

[Answer] The MT-1 Tokamak, built with Soviet cooperation, was dedicated in the middle of 1979 in the KFKI at Csilleberc. Naturally it is not suitable for producing fusion reactions because we can achieve "only" 5 million degrees in it, but it can be used to an outstanding degree to study very hot plasma. Research dealing with the effect of the plasma on the wall of the equipment is very effective as well.

In addition we have developed a lot of measurement equipment which can be used to observe the processes taking place in the plasma in milliseconds or in a tenth of a millisecond; these include, for example, the roentgen spectrometers. The development of the computerized measurement data collection and control systems needed for Tokamaks was very successful too. For example, equipment developed and manufactured at the KFKI will control the T-15 Soviet Tokamak which will be put into operation next year and which is among the four giant Tokamaks mentioned.

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HUNGARY PARTICIPATES IN SPACE TELECOMMUNICATIONS

AU031223 Budapest NEPSZAVA in Hungarian 26 Sep 85 p 3

[MITI report: "We Are Participating in Space Telecommunications--Scientific Conference at the Telecommunications Research Institute"]

[Text] On 25 September a 2-day scientific conference began in the Telecommunications Research Institute [Tavkut] with about 200 participants. The conference deals with the results of telecommunications research and development and the tasks to be performed in the next plan period.

Concerning developments in recent years, the speakers pointed out that the most significant progress affecting the entire science of telecommunications had been made in providing conditions for changing over the digital information transmissions. Nowadays, such systems are in widespread use, ranging from telephone exchange networks to transmissions by satellites. The application of equipment with computer technology is also widely used: the operations of telephone exchange centers are, in fact, more and more linked to microprocessor control.

During the Sixth 5-Year Plan period the Hungarian research and development branch has participated intensively in further developing the work to solve problems inherent in parts of projects relating to space transmissions and to create adequate bases in Hungary for developing light transmissions and the entirely new branch of science related to this. Precisely because of the research activities at the institute, in Hungary today there are testing devices that are based on the use of light conducting fibres and atmospheric transmissions. The devices are not only applicable to a wide range of activities, but are most probably capable of being further developed to utilize lasers.

In the telecommunications systems development process, in recent years experts have been working primarily on prototypes for subsystems meant to serve the sparsely populated provincial communities. At present there are three such systems undergoing tests in our country and according to some forecasts these systems could be set up for actual operation during the next 5-year plan period.

Relating to space transmissions, within the framework of the Intersputnyk program it will be the task of Hungarian experts to develop the ground-based

switching system for the projected worldwide network system. A domestically-developed 800-channel station is already operating in Taljandorog and is in direct satellite contact with a station in the Soviet Union. It will be an important task of the coming years to further develop this installation and to produce a so-called "free-channel selection system" which will allow the station to transmit to the individual receiving stations on channels that happen to be unoccupied at a particular time.

The scientific session will continue its work on Thursday [26 Sep] with section meetings.

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COMPUTER FIRM THRIVES ON NON-BLOC SOFTWARE EXPORTS

Budapest MAGYAR HIRLAP in Hungarian 11 Oct 85 p 12

[Interview with Dr Mrs Istvan Weisz, office chief for the SZAMALK, by Kristov G. Kocsis: "Turnkey Computer Technology; A Visit to the SZAMALK; Taking a Risk to Implement Brain Storms"]

[Text] Many domestic enterprises might envy the foreign press of the SZAMALK [Computer Technology Applications Enterprise]. For example, the prestigious economics journal ECONOMIST writes this way: "Hungarians have written a good number of the best computer programs of Europe.... The annual trade of the SZAMALK, their largest systems house, is more than 1.5 billion forints and last year they delivered one million dollars' worth of software to capitalist countries."

It is true that even by Western European standards the SZAMALK is a computer technology firm of unparalleled size. One who keeps track of domestic economic processes might justly ask what necessitated the combination 3 years ago of the NOTO-OSZV [NOTO National Computer Technology Enterprise], the SZAMOK [Computer Technology Training Center] and the INFELOR-SZAMKI [Information Processing Laboratory-Computer Technology Research Institute], enterprises with different profiles and different roles in the economy. For even then the members of large organizations were trying to split off and it was precisely computer technology where the market was changing most dynamically and where more laurels were going to the flexibly maneuvering small organizations. But according to Dr Mrs Istvan Weisz, office chief for the SZAMALK, their activity fills a domestic vacuum.

[Mrs Weisz] The strength of a systems house of this size lies in its vertical structure. At the same time we can offer computers and system programs, develop the user software and take care of service and instruction. The customer does not find all this together with any other. In addition a more respectable capital strength and the greater guarantee offered by it can be written to the credit of a large enterprise.

In their time the three founding enterprises did not have to face sharp market competition. The NOTO-OSZV sold the ESZR [Uniform Computer Technology System] computers of the socialist countries and offered complete technical service. At that time the enterprises could still purchase ESZR machines with state support or preferential credit. The SZAMOK, dealing with professional training, was a budgetary unit enjoying even UN support, and even at the INFELOR-SZAMKI they prepared programs for special state tasks 25-30 percent of the time.

It is a fact that the market environment has changed radically since the "marriage". State support for the installation of computers has become indirect, the more difficult economic situation holds back enterprise investments, and today the markets favor the microcomputers instead of the large machines offered by us.

[Question] How did you succeed in meeting these challenges?

[Answer] Quite well. Our gross sales receipts increased by 13 percent between 1982 and 1984, our profit by 95 percent; and all this with an 8 percent decrease in our 1.3 billion forints' worth of assets.

[Question] Providing "turnkey" computer technology service was that good a business?

[Answer] Not only that. Even today the large projects mobilizing the entire enterprise represent only 15-20 percent of our sales receipts; by the end of the next 5-year plan period we want to raise this to 35-40 percent. So we have to grab tasks which are better suited to a small organization too. So we have formed 11 offices within the enterprise, to preserve flexibility. These make plans and sign contracts independently, they exercise employer rights and their costs and wage management is independent.

[Question] In what sort of tasks can you invest the advantages hiding in a large enterprise?

[Answer] For example, we are the only ones in the country servicing, archiving and propagating socialist program products. We now record about 120 programs and some of those have been sold more than 300 times already.

In any case, 37 percent of our own sales receipts come from sale of software, and the SZAMALK is system patron for a good number of program packages written for large machines, packages obtained from abroad or developed domestically.

[Question] In regard to hardware, you recently came out with leasing of socialist made computers....

[Answer] And under very favorable conditions, because the enterprise can pay the leasing fee out of costs, so acquiring a modern machine does not burden its investment sources. The accumulation and property taxes to be paid on the machine are assumed jointly and following the 3-5 year lease they can purchase the computer in return for a one percent fee. In addition, naturally, we offer complete hardware and software service.

[Question] Pardon me, but so many advantages seem suspicious....

[Answer] Look, the internal market relationships and inter-state agreements both influence trade in ESZR machines. The SZAMALK does not want and is not able to give up selling the equipment; a good part of its activity is linked to this. So in the nick of time the General Undertakings Bank Company put 300 million forints into the business of further propagating socialist computers.

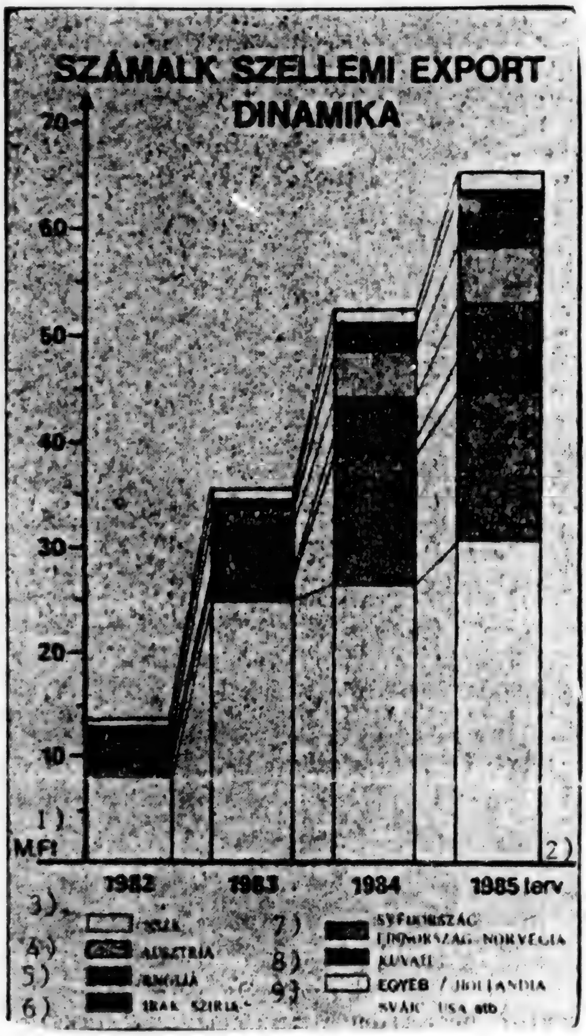
[Question] Many consider the ESZR machines unreliable....

[Answer] Without foundation. There is no greater difference between a computer of socialist manufacture and one of western manufacture than--let us say--in

the case of tractors from the two markets, and they don't write about that. In any case one hardly needs a more powerful argument for the ESZR machines than the fact that they are used continually, profitably and almost to the exclusion of all others in the 22 computer centers of the SZUV [Computer Technology and Management Organization Enterprise], the largest domestic data processing enterprise. The problem really is that sometimes the users economize on the most critical elements, or put their own mistakes on the neck of the machine.

[Question] How do you intend to preserve your competitiveness in the future?

[Answer] In the coming plan period we want to create SZAMALK's own microcomputer manufacturing capacity, primarily--following international trends--we would like to increase the weight of our program preparation in their activity. One quarter of the income from software planned for this year will be made up of intellectual export to capitalist countries. In the past 3 years this sum increased more than four times, and it would be good to preserve this trend. In the future we must constantly modernize the internal organizational and incentive system and in the sharpening market situation we must create an opportunity for the offices to undertake risk at the burden of their own profit, because this is necessary to implement the real "brain storms."



SZAMALK Software Export Dynamics

Key:
1. Millions of forints
2. Planned figures
3. FRG
4. Austria
5. England
6. Iraq-Syria
7. Sweden-Finland-Norway
8. Kuwait
9. Others (Holland, Switzerland, USA, etc)

8984
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HUNGARY

ESSENTIAL SUPPORT FOR TECHNICAL PROFESSIONALS STILL LAGS

Budapest MAGYAR NEMZET in Hungarian 14 Oct 85 p 5

[Interview with Dr Laszlo Fodor, deputy first secretary of the Hungarian Chamber of Commerce, by Agnes Laszlo: "Engineering Congress: Still Waiting for a Change"]

[Text] The 17th national engineering congress began Sunday in Salgotarjan. Experts from various parts of the country are discussing the place, role and tasks of the technical professionals at the meeting. One of the speakers on the theme is Dr Laszlo Fodor, deputy first secretary of the Hungarian Chamber of Commerce, who was one of the developers of the Seventh 5-Year Plan concept for technical development policy at his former place of work, the Plan Office. In connection with this most important goal, among the future tasks of the national economy, we talked with him about the lessons and experiences of the recent past and the requirements of the near future.

[Answer] First of all it must be said that scientific and technical development have accelerated extraordinarily in recent decades. The extent to which a national economy has been able to keep up with this pace has fundamentally influenced the place and role it has been able to win for itself in the international division of labor. A constant, continual modernization of products has become a condition for the survival of enterprises in the industrially developed countries. And those countries achieved outstanding results where the adoption of a developed technical culture has become dynamic, where the state took over the material burdens of expensive research at a few essential points and where, even today, the training of highly qualified experts is appropriate, the training of experts who, on the one hand, are capable of operating the new producing equipment and, on the other hand, have become "consumers" of the new type devices and services.

The Consequences of Being Late

[Question] Was the Hungarian economy able to follow these changes in time?

[Answer] The Hungarian socio-economic system tried slowly and late to catch up with those developmental trends which today determine the world economic changes. An extraordinarily unfavorable situation developed as a result of the fact that the domestic technical development level not only lags behind the

international level but, unfortunately, the lag increases year by year. Because when, at the time of the recession, the developed countries, constrained by the economic situation, renewed the technological systems and products, the innovation trends here slowed down. Thus now, as things pick up, the weaknesses of the Hungarian economy are coming to the surface sharply. And this could have certain unfortunate consequences.

[Question] Could you mention a few of these?

[Answer] The changes which might have helped to increase the ratio of modern, competitive products fitting the parameters desired by the world market did not take place in the structure of the economy. Indeed, the ratio of products representing peak technology is intolerably low in our offerings. What is even more worthy of attention is the fact that the expenditures are a good bit greater than permitted even among those working with a following technology. It increases the backwardness that it was necessary to limit investments and the modernization of equipment slowed, in order to create a balance situation for the economy. The combined effect of all this was that technical development lost prestige as a socially useful and important activity.

[Question] Was a role played in this by the fact that profit interest did not become a driving force for technical development?

[Answer] The reasons are quite varied. Perhaps the most essential is that we did not develop an economic environment encouraging innovative enterprise behavior, and creating real interest for those working in technical development did not become a vital question for the managing organizations. In the hierarchic organizations which have developed the crucial majority of the technical people perform executive tasks and there are few possibilities for creative work based on independent responsibility. Nor does the present system of economic regulation adequately honor developmental efforts. Just the opposite. In enterprise management today the expenditures appear as an extra burden. As a result of this a view has developed that the existing technology limits technical development. Those developing products are constantly forced to make compromises, saying that they are not trying to produce new products, because the technology for them is not available. The spread of this attitude has created an extreme situation where the managing organizations are not even exploiting their given possibilities, out of convenience or shortsightedness.

Despite the Lessons

[Question] What if they did?

[Answer] I am convinced that they might achieve substantially better results. But since basically nothing forces them to do so, since their survival does not depend on making practical use of the results of research and development, they stay at the level where they are. It is true that they also run into objectively existing limitations if they want to innovate. Adopting modern technology requires capital and import. And it is well known that both were available to a decreasing degree. The strict import management greatly narrowed the possibilities for and freedom of movement of technical development.

[Question] Looking back to the beginning of the 1980's, do you think this practice was correct?

[Answer] There was no other choice. It was not possible to increase investment to the detriment of consumption. It was necessary to meet social policy needs which did not tolerate delay. This was why it was not possible to encourage accumulation by reducing consumption. But it is a matter for thought whether it was correct to keep the minimal conditions necessary for keeping up within such strict limits, even if we recognize that in the past 5 years a very worthy sum, 3 percent of the national income which could be used internally, was provided for research and development.

[Question] Yes, but in a number of places they used this money in a wasteful way.

[Answer] Unfortunately the use was not always rational. The parallelism of programs divided up into many themes scattered the capital instead of concentrating it on the most essential points. Innumerable resources were used to maintain and even expand non-progressive activities. And we concentrated only a relatively small part--even today--on the branches of industry requiring special treatment, such as electronics or microelectronics. And again, there are only structural, personal and division of labor reasons for this. There must be a much more rational distribution, differing from the previous period, if we are to get ahead. We must also change the practice of making impossible demands on the areas, institutes and enterprises handling science and technology development. We cannot ask them to become profitable immediately on adopting new techniques and technologies. But this is what we have been doing. And what was the result of this? Those organizations which started developing at a rapid rate sooner or later came to a sudden stop because of management problems.

An Urgent Task

[Question] Have measures been taken to change this?

[Answer] Yes, but thus far these have been far from satisfactory. We are still waiting for a change that would be drastic enough.

[Question] But how long?

[Answer] I hope not long. If simply because the Hungarian society and economy must solve tasks which do not make possible any considerable increase in the sums which can be turned to accumulation in the second half of the 1980's. We cannot give up a reliable energy supply, the development of energetics or the supply of raw materials. There is an awful lot to be done to put an end to the backwardness of the infrastructure, and the development of the living conditions of the populace is not a matter of indifference either. For these very reasons the responsibility of all those who guide, influence or implement research and development policy is gigantic. The priority task is to stop the increase in the backwardness of the Hungarian technical level. If we can do it then we have a chance to start catching up at a few well thought-out points.

And this will require that those responsible learn to say no and to shoulder the possible conflicts affecting personal and institutional interests.

[Question] What are the international trends where we absolutely must find points of contact?

[Answer] We must go forward in basic research in material science with the goal of considerably raising the quality level of Hungarian primary material manufacture. Spreading biotechnology on an industrial scale and a broad spread of the use of electronics cannot wait. And I need not say that an important role is waiting for the technical professionals in realizing all this. So the renovation of expert training, a desicive transformation of the research infrastructure and a concentration of the talents and expertise of the existing technical personnel are urgent tasks. To do this we must see to it that research results and intellectual products become valuable commodities, we must create a market for them and on the basis of the value judgment of this market the social utility of technical activity must again achieve appropriate rank. So we must develop an economic environment in which technical development becomes a vital interest of the managing units. We must see to it that the circle of Hungarian producers again develops a staff of designers which will become a determining factor for long term marketable production. And we can do this only if the highly qualified experts do not invest their expertise on outside careers which become a business for them.

8984
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POLAND

RESEARCH ON DURABILITY OF NUCLEAR POWER PLANT TUBE SHEET WELDS

Warsaw PRZEGLAD ELEKTROTECHNICZNY in Polish No 3, Mar 85 pp 109-113

[Article by Ewa Hajewska (doctor in engineering), Jerzy Galazka (docent and doctor habilitatus in engineering), Leszek Hinz, ME, and Witold Szteke, ME: "Factors Affecting the Quality of Tube-Tube Sheet Joints in Steam Generators and Heat Exchangers in Nuclear Power Plants"]

[Excerpts] Introduction

One of the basic problems in the process of production of nuclear energy facilities is the maintenance of the technological demands of their performance, which assure the procurement of products with high reliability. This prerequisite arises from the work specifications for all installations whose proposed work life exceeds 30 years.

In the steam generators and heat exchangers of nuclear power plants the critical site which decides the quality and reliability of the facilities is the tube-tube sheet joints. In the Atomic Energy Institute the technology for the automated welding of tubes in sheet joints has been worked out. In the course of this work many experiments were carried out, experiments which showed that such joints are very susceptible to corrosion, where the materials joined may have become sensitized in the welding process.

Characteristics of the Materials

Two types of products were joined: thick sheets (60-120 mm thick), from which are made the sheet bases of heat exchangers and the collectors of steam generators, and thin-walled tubes with an inner diameter of 16 mm and wall thickness of 1.2, 1.4, and 1.8 mm [1+5].

Before proceeding to work out the technology of welding, we performed detailed experiments on the properties of the materials, with particular attention to those properties which could affect the quality of the welds obtained and in the final analysis the quality of the finished product, i.e., the heat exchanger or steam generator.

We tested the half-finished goods, i.e., the tubes and thick sheets of Polish manufacture and of the same products from the Swedish firm SANDVIK

and the West German firm MANNESMAN. We confirmed many differences in the composition of non-metallic impurities and their distribution in individual products. The greatest amount of impurities and of structural defects were found in Polish products. The primary select tubes and sheets produced by SANDVIK were chosen to develop the technology for welding tube-tube sheet joints.

All the half-finished products were made from steel of quality OH18N10T. Their chemical composition was verified, and it was determined that they met the expected norm [1, 2].

We examined the type and composition of non-metallic impurities and their distribution with regard to the structure of the materials. It was determined that the tubes contained small amounts of non-metallic trace impurities like oxides and sulfides with isolated distributions of titanium carbonitrides. The structure of the tubes was finegrained-austenite with numerous binary crystals and rarely occurring strands of δ-ferrite. After saturation (1323°K for 30 minutes, quenching in water) there was a slight increase in granulation, but after additional sensitizing annealing (823°K for 2 hours, cooling in a kiln) solitary and unevenly distributed carbides were isolated on the edges of the austenite granules.

The sheets contained a small amount of non-metallic impurities and concentrations of titanium carbonitrides. Here and there we noticed concentrations of oxides rolled out into thick surface coverings. This is that dangerous defect of the half-finished product which can cause for example the scaling of the material or in the event of a diagonal intersection (openings into tubes) the onset of corrosion. The structure of the sheets was austenitic with uneven granule size. In it could be observed a certain number of δ-ferrite granules placed corresponding to the ductile axis. Thus a growth in the austenite granules followed saturation, and carbides appeared on the austenite granule surfaces after the additional sensitizing annealing.

We also tested the resistance of the material to intercrystal corrosion, completing a test run standardized according to PN-66/H-4630, which depends on the heating of samples laid on copper shavings in a solution of copper sulfate in sulfuric acid. It was found that the materials tested did not show a tendency toward intercrystal corrosion under test conditions. Only samples cut from plates after saturation and annealing showed small traces of intercrystal corrosion.

Corrosion in Welded Joints

It is known from the literature that approximately 40 percent of the damage in heat exchangers and steam generators is caused by corrosion in the tubes or tube-sheet welded joints. In connection with this, during the course of working out the technology for producing welded joints between tubes, we performed corrosion tests. In accordance with the circumstances of the selection of fittings for nuclear energy plants, we tested the tendency of joints toward intercrystal corrosion in conformity with test A according to PN-66/H-4630. Because of the atypical form of the joints

the samples for the experiments were not standardized. A joint was cut into four parts, so that one plane section passed through the arc extinguishing zone and the other through the permanent weld zone, and each time two of them were used for the corrosion experiments. Concerning the form of the samples, it would not have been possible to include all combinations of degrees of variation in corrosion (variations in mass and measurements, acoustic tests, variations in mechanical properties). The tendency of the joint toward intercrystal corrosion was thus evaluated entirely on the basis of detailed metallographic tests via a comparison of the microscopic images before and after corrosion.

In the majority of cases no traces of intercrystal corrosion were confirmed in the so-called representative joints. Certain samples were sensitized to corrosion in the area of the heat input zone. At that time the adhesion of carbides to the surfaces of granules in the spongy sheet material was observed. This particularly concerned repaired joints, which is to say joints which had been welded two and three times.

After the corrosion experiment intercrystal corrosion was observed in certain joints in tubes and sheets on the clearance side. After detailed study it was confirmed that the corrosion appeared precisely when the joints had been insufficiently prepared for the welding, e.g., in the event of badly formed and ill-worked openings at the sheet bottoms or in the case of the use of tubes with a bad surface state. Corrosion also appeared on joints which had been badly cleaned before welding, so that there were filings and lubricants left in the cracks. It was confirmed that heavy concentrations of oxide impurities in the sponge sheet material could also be dangerous if they were left at the point of contact. Such impurities can cause an onset of rigidity in the weld, scaling of the material, or the onset of intercrystal corrosion.

The circumstances for the selection of heat exchangers and steam generators anticipate only the examination of the tendency toward intercrystal corrosion. On the basis of the experiments performed it was confirmed that tube-sponge sheet welded joints are not subject to intercrystal corrosion if they have been made from high quality materials and if they have fulfilled all the conditions foreseen in the technology. The failure to meet whichever parameter in the welding process or the careless preparation of the joint parts before the welding may lead to the appearance of intercrystal corrosion. On the other hand it appears that the possibility for the appearance of tension corrosion in welded joints is more dangerous for the heat exchangers of the facilities under discussion. A joint forms its own pressures during mechanical working and in the welding process, they may have serious consequences, at times even resulting in the deformation of ductile materials. Therefore, to the conditions for the selection of facilities for nuclear energy we should introduce a qualification on the necessity of performing tests on the tendency of the materials and the joints to undergo pressure corrosion.

Conclusions

The tests showed that obtaining welded joints of the required quality is conditional upon the maintenance of the welding parameters within defined tolerances along with the preservation of narrowly fixed assembly conditions and cleanliness in the preparation of the surfaces of the joint elements.

A similarly essential condition for the assurance of quality is the use during the construction of the facilities of materials which are certified for good characteristics. This means materials of definite and verified chemical composition, a structure which does not include non-metallic impurities like oxides, rolled out, and not sensitive to intercrystal corrosion. The surfaces of the half-finished product should be completely smooth and clean. During the whole production process of facilities for nuclear energy, what is indispensable is the sustained control of both the characteristics of the initial materials and the maintenance of the technological parameters.

12469
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ROMANIA

SUCCESSES IN NUCLEAR MEDICINE DESCRIBED

Bucharest MAGAZIN in Romanian 28 Aug 85 p 4

[Interview with Dr Tiberiu Pop, by Daniel Cocoru; date and place not specified]

[Text] An ultrasound image of the human organism. Radioisotopic investigations of the utmost precision. Help for infertile women. Authoritative scientific innovations. Early diagnosis, first step toward renewed good health.

The patients are speaking in whispers: you can feel their apprehension and their hope. Large, functionally equipped rooms. Pleasant colors. New, sophisticated electronic equipment, large, transparent glass doors. The light is white, unaccented. We are at the Nuclear Medicine and Ultrasonics Unit of the Clinical Hospital Panduri, in Sector 5 (director: Prof Valentin Neagu), recently reopened after 6 months of remodeling and modernization, a project which as we could see, did not harm the reputation of the Carpati General Contracting Trust of Bucharest.

We are speaking to Dr Tiberiu Pop, doctor, winner of the Romanian Academy Prize, AIEA (International Association for Atomic Energy) expert, member of many scientific societies here and abroad, who has just returned from a specialization program in Japan and the Philippines. We asked him to tell us what is new at the Nuclear Medicine and Ultrasonics Unit, which he leads.

[Answer] As you have noticed, we have new equipment and new surroundings, which are more functional and we must admit, more appropriate for our instruments. We work with highly sensitive, extremely delicate electronic equipment, which must be protected from dust and especially from temperature changes.

[Question] Before discussing what is new in technology, could you mention your scientific activity?

[Answer] First of all, I should discuss our day to day professional activity, since scientific research merely complements this activity and is not an end in itself. Our primary goal is our work with patients, to whom we dedicate

everything, all our capabilities; these impressive facilities are for them, and it is for them that we pursue the scientific research about which you asked. The collective which I lead is currently carrying on a number of research projects started last year. I am thinking in particular of hysterosalpingoscintigraphy and iliopelvic limoscintigraphy (a Romanian first, with the collaboration of Dr Mihai Galeseanu and Dr Nicolae Vasilescu, of the hospital's urology clinic). In the first type of investigation, which is irreplaceable in fighting sterility in women (it is certain, precise, and completely painless), we are pioneers in Europe because, as I was able to observe at the European Congress for Nuclear Medicine held in Helsinki, no clinic on our continent has accumulated as much experience, and nowhere has the method been practiced on as many cases. It may have not been of interest to the Europeans, given their demographic policy, but it is a worldwide innovation, since hysterosalpingoscintigraphy made its appearance only 2-3 years ago. From our standpoint, the outstanding results and extensive experience to which I referred, come from a close collaboration with sterility departments, particularly with the Giulesti Clinic of Obstetrics and Gynecology (Dr Bogdan Marinescu and Dr Mihai Niculescu) in Bucharest, as well as with others in the country. I repeat, the value of hysterosalpingoscintigraphy as practiced here to help infertile women, will grow even further with the entirely new and improved equipment which we now have.

[Question] Although we had agreed to discuss technology in the second part of our conversation, it is nevertheless omnipresent, and not only around us. In fact, instrumentation is involved in nearly everything that you do here, in all your achievements.

[Answer] nuclear medicine unquestionably implies special technology, but controlled by man, by people with exceptional qualifications. It is still true that technology does have its place here. Maybe more than any other specialty, nuclear medicine and ultrasonics depends on technologic progress, and that is why we strive to remain current with the latest advances in the world, such as computerized tomography, Without going into details, since the readers of MAGAZIN certainly know about the performance of the two computerized transmission tomographs (at the Fundeni Hospital and the Gh. Marinescu Hospital), I do want to show that a significant step forward is represented by computerized emission tomography, in which the radiation no longer comes from outside, from a high voltage, but rather from the few microcuries of the practically harmless radioactive dose administered to the patient according to well established methods and for a well established purpose. I don't believe I exaggerate when I say that it was our good fortune to have a new computerized tomograph--the first in Europe, equipped with a digital scintillation camera, installed at our nuclear medicine and ultrasonics unit and connected to the existing large computer. Added to this ultramodern instrument, whose applications are truly fantastic, is the new endosonograph, which connected to the same computer, provides better, more precise possibilities for exploring with ultrasonics the bladder and the prostate through avenues close to the problem area. I should point out that while endosonography does exist elsewhere, the one we have here is probably the only one in the world which is coupled to a computer to yield color images

through electronic data processing with specialized programming. I said the only one in the world because in June of this year, at the 20th International Urology Congress in Vienna, a paper on the work performed with this instrument, presented by prof Valentin Neagu, was received with great interest by the audience: more than 80 percent of those present inquired first of all about the method and technical quality of these sensational color images, and afterwards about their clinical significance.

[Question] In other words, exceptional interest in the technical performance of Romanian medicine.

[Answer] We are in fact achieving another international success, also in connection with the computer, a Romanian idea which I have to say was considered impossible by the sonograph manufacturer. Our specialists proved once more that it is possible, and the paper presented in Vienna shows that a constant concern of our collective is to improve the performance of the advanced equipment which we are endowed. The outstanding technical foundation, but especially the high qualifications of my collaborators (Doinita Dumitrache, radiochemist; Elisei Petru, biologist; Emil Torolman, physicist), allowed us to conduct in Romania a series of extremely precise radioisotopic studies with diverse pathologies, and to undertake a number of investigations in Romania for the Academy of Medical Sciences, the Institute for Biological Sciences, the National Council for Physical Education and Sports, and abroad for AIEA in Vienna, an international organization of high standing with which we have been collaborating for several years under excellent conditions through contracts and technical assistance programs.

[Question] Coming back to the patients, to the people for whom this modern nuclear medicine and ultrasonics unit was built, it should be pointed out that those who come here do not regain their health overnight; but what is learned about them through very precise and thorough investigations is priceless. It is an important step toward good health.

[Answer] You remind me of an old proverb of Chinese wisdom, which says that the longest road begins with one step, the first step. In our trade, the first step toward good health is the diagnosis. I believe that the importance of a correct and timely diagnosis no longer needs to be stressed: therapy can be established more easily when the diagnosis is precise, and if we think of some widespread diseases such as cancer of some of the cardiovascular problems, success depends almost exclusively on an early and most exact diagnosis of the problem. Nuclear medicine and ultrasonics exploration open new diagnostic possibilities.

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ROMANIA

PERSONAL COMPUTERS PRODUCED IN COUNTRY

Bucharest COMERTUL MODERN in Romanian No 3, May-Jun 85 pp 34-36

[Article by Teodor Purcarea]

[Text] The directives of the 13th Congress of the RCP stipulate "expanded research to improve the quality of life," to be one of the principal directions of scientific research, technical development, and the introduction of technical progress, correlating it with a "greater contribution on the part of scientific research to hasten automation, electronic implementation, and robotization in production and other socioeconomic activities." One major objective is expected to be diversification and quality improvement in consumer goods and services for the population. The emphasis is thus placed on qualitative improvement, with microelectronics and computer support assuming a special role as part of the perspectives opened by the new industrial revolution.

As we know, the metamorphosis of electronics brought about by the successive introduction of the transistor, the integrated circuit, and the tiny microprocessor on a silicon chip, has transformed automation and telecommunications, and has enabled the emergence of information technology and more exactly, computerization with its specific product, the computer program.

Considered by developed nations as an important industrial product due to the role it plays in robot operation, flexible automation, and expert systems, the computer program, when it made its appearance about midway through the past decade, was the genesis of the personal computer and of the use of software by those who are not computer specialists.

In Romania, information processing activities began in 1967 with the party leadership's approval of the Program to Endow the National Economy with Modern Computer Equipment and to Automate Data Processing. On 17 September 1970, the secretary general of the party, Nicolae Ceausescu, met with specialists in the fields of electronic computer technology and economic information, an event which indicated the need for designing a unified national system for information processing and management. Similarly, a party decision adopted in 1972 led to the Program for Scientific Research approved by the 12th Party

Congress; for the past several years, research based on this program has been conducted in the technology of artificial intelligence, so that during the 1986-1990 five-year plan it will be possible to offer for exportation the first Romanian expert systems, true agents of the computer revolution. The future directions of computer development and of the successive stages of computer construction, were the topic of an extensive discussion organized by the Romanian Academy in the spring of 1984, with the support of specialists from large specialized research units (the Institute for Computer Technology-ITC, the Central Institute for Management and Information Technology, and so on). It can be said that Romania has an optimum framework for defining long range projects for computers of the fifth generation, participating actively in the international effort initiated by the Japanese in 1981 at the Tokyo International Conference. It should be pointed out however, that long before this conference, the 23rd session of the UN General Assembly adopted, at Romania's initiative, Resolution No 2458 regarding the utilization of computer technology for development.

Electronic computer technology has thus become a major concern of the modern world, with four major classes of computers being considered: large computers, minicomputers, microcomputers, and the newest one, personal computers. The latter are of two kinds: business computers and home computers; the first are generally produced by specialized companies which offer a broad range of programs and languages for commercial use and for processing the data customarily used by workers; the second type are manufactured by producers of electronic consumer goods, and are used for a variety of purposes arising from a family's individual interests. Projected for the future are portable personal computers that can be used in both situations.

The personal computer is based on a powerful and versatile microprocessor, or even on a coprocessor (double processor); it can be used with a television set (even a conventional one) which serves as display, while a conventional tape recorder is used for external memory. Some of its largest applications are: statistical, technical, and scientific calculations, the organization of personal files, the management of funds, the simulation of specific management activities, automatic information retrieval, text processing, graphics, computer instruction of persons of all ages, text creation, general utilities for personal use (agendas, telephone lists, medical consultations with diagnostics and appropriate treatment indications), testing household appliances and automobile engines (using pulse transducers, stroboscopic lights, pressure and temperature transducers, and so on), entertainment-instructional games (chess, checkers, Go, and so on), computer aided instruction (codified geography, history, medicine, mathematics, biology, chemistry, music, and other information, and testing of students and pupils), and so on.

One significant aspect of this latter application is the use of an advanced technology for the multilateral training of the young. In his report to the 13th Congress of the RCP, Nicolae Ceausescu pointed out that "a constant

concern for arming the young generation with the newest triumphs of science and technology, of human knowledge, is an honorable duty as well as the guarantee that new members of the party will be trained in a revolutionary spirit."

One interesting experiment which helped accomplish these tasks, has been the original computer camp in Baciu, Brasov county, organized at the beginning of this year through a collaboration between the National Council of the Pioneers' Organization, and the Bucharest ITC.

The comprehensive goal of the organizers was for pioneers to become familiar with computer resources, acquire a minimum of knowledge about computer construction, learn a programming language, and become accustomed to the use of computers in exploring problems specific to school activities. The camp was endowed with a FELIX M-118 office computer (built in 1981 by the Computer Plant, an enterprise which in 1983 also produced the first Romanian CUB personal computers, equipped with 8-bit microprocessors), seven individual PRAE-M personal computers (built by the Cluj subsidiary of ITC), and eight MIC personal computers (built by the Bucharest Polytechnic Institute).

The organizers of the first computer camp for pioneers in our country concluded that the goal has been achieved, the experiment constituting a solid basis for the large scale introduction of computers in the educational process and society, thus accomplishing a significant revolutionary step forward.

Both personal computers used in this experiment went into production last year in Timisoara, and beginning with this year they will be mass produced.

For these computers, ITC is producing application programs of real interest, written in a high level language. Together with the development of these systems, research is continuing to introduce the production of personal computers equipped with 16-bit and even 32-bit microprocessors. A constant concern thus exists to meet the performance of similar products on foreign markets, as eloquent proof of our specialists' standing in this field.

Together with preparations for the exportation of such products, a large role must be played by the supply to the domestic market. Considering their role in raising labor productivity, personal computers must unquestionably be made more accessible both to interested socialist organizations (production enterprises, research and design institutes, educational units of all levels, and so on), and to the various segments of the population which have found it necessary to acquire an electronic consumer item of this level.

Consistent with its broad possibilities to satisfy the domestic market, the specialized industry as promoter of progress, civilization, and culture among the population, already has the organizational capability--resulting from the development of a specialized sales network for electronic products--to market these computers.

Tomorrow's computerized society is approaching rapidly. Together with computerization, work is expected to assume a new form of expression through the possibility of knowing and assessing the human energy incorporated in each product thanks to measurement and information technologies, so that the mind of man will be populated by new images which will fertilize his thought, culture, and civilization.

In the future computerized society, personal computers represent a superior avenue for preparation, with the social scale effects over a long period of time being considerable. As strategic products, these computers influence new fundamental directions of technical development: computer networks, videodiscs, voice activated input-output devices, and artificial intelligence (the ability to solve problems and learn from experience). Voice response devices for instance, will be indispensible in building expert "mechanical intellectual assistant" systems for the office, car, or home, automating work at a distance. The fifth generation of computers will mark the transition from data processing to knowledge processing.

The personal computer will also bring about a number of changes among users, developing their intuition, sense of precision, and the sentiment of being involved in the present tense of the new society, where the new source of energy, information, will transform all industries and will lay the foundations of the industries of the future. At present, the cutting edge represented by the personal computer is to achieve totally interactive systems and completely conventional languages. Facing this equipment are problems of higher performance and facilities, and the construction of networks that will permit the connection to powerful computer centers through telephone lines.

It is certain that in fulfilling its socioeconomic functions, domestic trade will have to continue to devote particular attention to consumer goods such as these, designed primarily to instruct the young generation; this is consistent with our state and party policy to train a vigoruos, well educated youth, capable of leading our socialist country to new peaks of progress and civilization, in a world of peace and international collaboration.

As initiator of many international proposals concerning young people, and chairing the UN Consultation Committee for the 1985 International Year of the Youth, our country continues to channel the young generation toward "Participation-Development-Peace."

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ROMANIA

BRIEFS

RESEARCH ON PESTICIDE MICROINCAPSULATION--Experimental studies on the handling of pesticides through incapsulation have been started at the "Petru Poni" Institute of Macromolecular Chemistry of Iasi. The research is aimed at working out some processes of microincapsulation suitable for the existing supply of raw materials and applicable for the pesticides used or proposed for use in Romania. Among the latter the following were experimented with: Disulfoton, Malathion, Dimethoate, Buthylate, DDVP, Trifluralin, Metolachlor, Decamethrin, Pirimphos methyl. The products realized, in the form of aqueous suspensions of microcapsules with semipermeable walls, were the subject of preliminary biological experiments at specialized research units of the Academy of Agricultural and Forest Sciences and the Ministry of Health. These experiments, correlated with the technological aspects of synthesis of products and with corresponding toxicological studies, are being finalized with a view to selecting the varieties of products with potential use under the agro-technical conditions specific to Romania. [Excerpts] [Bucharest REVISTA DE CHIMIE in Romanian No 7, Jul 85 p 611]

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